

Doors to Largest NCC Ever Swing Open Today

By Cheryl M. Gelb
CW Staff

HOUSTON — In a city that evokes both the spirit of the Old West and the enterprise of the New Frontier, the National Computer Conference will begin here this morning, when the doors of the Astorhall swing open to admit the first of 80,000 to 100,000 expected attendees.

The four-day event will offi-

cially begin at 10 a.m. when James E. Olson, vice-chairman of the board and a director of AT&T, delivers the keynote address.

With more than 684 vendor companies using over 320,000 square feet to display their wares, NCC '82 features the largest exhibit area in the show's 31-year history. The size of the exhibit — which begins in the Astorhall and

Computerworld will be at NCC '82 every day — look for the NCC Daily! each morning outside your hotel room door, in your hotel lobby or at CW's Booth 2500 on the exhibit floor.

spills over into the Astorarena — breaks last year's NCC record, when 525 vendors filled 230,000 square feet

at Chicago's McCormick Place.

The first of 84 technical sessions devoted to "Advancing Professionalism," this year's conference theme, will begin at 1:45 p.m. The sessions have been organized into nine tracks: hardware/software architecture; software engineering; personal computing; social and organizational im-

(Continued on Page 4)

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER



Wide World Photo

Escape to Safety

Two women escape from an IBM building in Bethesda, Md., after a masked man crashed his car into the lobby of the building, leapt out firing a weapon and killed two IBM employees. Story on Page 2.

Survey of DP Managers Finds Pay, Budget Freezes

By Tom Henkel
CW Staff

Everyone suffers in a recession, and DP is no exception.

A random Computerworld telephone survey of 10 DP managers across the

country last week revealed that while few have been forced to cut back on projects or personnel because of the recession, the people who handle the corporate purse strings are hanging onto them more tightly.

What that means, the DP managers interviewed last week explained, is that their departments are no longer receiving preferential treatment when it comes to salaries or benefits. Moreover, they are no longer confident that they can escape budget cuts and layoffs.

Nor will DPers be getting hefty salary raises this year, managers said. The reason? The rate of inflation has slowed and most companies have altered their salary policies accordingly. In fact, two managers said their firms have instituted salary freezes.

However, the recession has brought one advantage, the managers noted. DPers appear less willing to switch jobs in the current economy. Managers polled said qualified candidates

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Trend Building For Patents On Software

By Lois Paul
CW Staff

PALO ALTO, Calif. — There may be a movement afoot — albeit a quiet one for the present — toward patent protection for software products.

Ever since the landmark *Diamond vs. Bradley* and *Diamond vs. Diehr* cases in which the U.S. Supreme Court last year decided "that certain inventions involving computer programs meet the threshold condition for a patent to be issued"

(Continued on Page 8)

IPL, Singer Rated Tops In Mainframe Survey

By Tim Scannell
CW Staff

DELRAN, N.J. — Mainframes from IPL Systems, Inc. and Singer Co. placed first and second, respectively, in terms of overall user satisfaction, according to the results of the "1982 User Ratings of Computer Systems" just released by Datapro Research Corp.

Magnuson Computer Corp. and Amdahl Corp. tied for third place in the ratings. Computers from Honeywell, Inc. finished last.

Users of IPL's 4400 series computers who were surveyed also gave the system high marks for programming ease and ease of operation. They were also the only user group in a single-vendor category that unanimously recommended their mainframes to other users.

Although IPL users represented an extremely small portion of the total users surveyed — only eight IPL users responded to the survey — IPL beat out such computer heavyweights as Digital Equipment Corp., IBM and Sperry Univac, whose systems finished fourth, fifth and sixth, respectively, on the user charts.

PCMs Rated Higher Than IBM

All but one of the manufacturers of plug-compatible mainframes (PCM) were rated more favorably than IBM. Magnuson Corp. and Amdahl Corp. shared third place while National Advanced Systems Corp. — the third PCM manufacturer in the survey — came in seventh behind Univac but ahead of Burroughs Corp., NCR Corp. and Control Data Corp.

IBM not only ranked in the middle in this year's survey, but its 360 and 370 series machines wound up at the lower end of the user satisfaction spectrum.

For the third year in a row, Honeywell computers were rated last in user satisfaction. In fact, while about 50% more Level 62 users and 20%

Datapro charts with user ratings of specific systems begin on Page 57.

more 2000 series users took part in this year's survey than last year's, they gave those systems lower ratings than in the previous year. More than 80 users of the Level 62 computer — one of the firm's most popular systems — took part in this year's

(Continued on Page 56)



CW Photo

"We've had some miracles in product development in the past year... I try to make sure people with ideas take responsibility for what they are doing." That is how Ken Olsen, president of Digital Equipment Corp., described his management philosophy to Computerworld in an exclusive interview that begins on Page 10.

COMPUTERWORLD

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Editor John C. Whitmarsh
Managing Editor Rita Shoor
News Editor Cheryl M. Gelb

Senior Editors:
Features Catherine Marengi
Software Lois Paul
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Systems Timothy J. Scannell
Office Automation Bruce Hoard

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Writer/Analysts: Marguerite Zientara
Tom Henkel

Staff Writers: Jim Bartimo
Susan Blakeney

Correspondents:
New York Bob Johnson
Washington, D.C. Jake Kirchner
Phil Hirsch

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Chief Copy Editor Donovan White
Copy Editors: Dave Bouffard
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Kathie Gow
Steve Milmore
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Linda Rosenthal
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Barbara T. VanScoyoc

Editorial Assistants: Nancy Pinks
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Contributors:
Education J. Daniel Couger
Taylor Reports Alan Taylor

Human Connection Jack Stone
SPECIAL PUBLICATIONS

Computerworld Extra!
Editor Jack B. Rochester

Computerworld OA
Editor Ann Dooley

Copy Editor Nancy Fleming
Please address all correspondence to the

appropriate department at Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

Phone: (617) 879-0700. Telex: 95-1153.

OTHER EDITORIAL OFFICES:
New York City: Suite 7G, 401 East 80th St.,
New York, N.Y. 10021. Telephone: (212) 570-2135.

West Coast: 257 Lytton Ave., Palo Alto,
Calif. 94301. Phone: (415) 328-8064.

Washington, D.C.: 880 National Press
Building, 529 14th St. N.W., Washington,
D.C. 20045. Phone: (202) 347-6718.

England: Richard House, E.C. Publications, 30-31 Islington
Green, London N1. Phone: (01) 359-7481.

W. Germany: Eckhard Updehl, CW Publications, Fried-
richstrasse 31, 8000 Munich 40. Phone: (089) 34-90-61. Tel-
ex: 5213550.

France: Patrick Morel, Le Monde Informatique, 42, Avenue
Montaigne, 75008 Paris. Phone: 720 85 66.

Aisa: Mr. Shohel Kurita, Computerworld Japan, 1-19-7
Shintomi, Chuo-ku, Tokyo 104. Phone: (03) 551-3882. Telex:
252-4217.

Australia: Alan Power, Computerworld Pty. Ltd., 37-43
Alexander Street, Crows Nest, NSW 2065. Phone: (02)
4395133. Telex: SECCO AA25468.

Brazil: Eric Hippes, Data News, Computerworld do Brazil,
Servico e Publicacoes Ltda., Rua Alcindo Guanabara,
25/10th Floor 20031 Rio de Janeiro, RJ Brazil. Phone: (021)
240-8225. Telex: 2130836/WORD BR.

Mexico: Richard Small, Computerworld de Mexico, Oaxaca
21-2, Colonia Roma, Mexico City 7 D.F. Phone: (905) 514-
4218. (905) 514-4309.

Spain: Neil Kelley, Computerworld/España, Barquillo,
38, Madrid-4.

Denmark: Helle Lind Christensen, Computerworld/
Denmark, Gamle Strand 50, 1202 Copenhagen K. Phone:
01-1234-11.

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Former IBM Employee on Shooting Spree Kills Two at Maryland Division Office

By Susan Blakeney
CW Staff

BETHESDA, Md. — A former IBM employee went on a shooting spree at IBM's Federal Systems Division building here on Friday morning, May 28, leaving two employees dead and injuring at least eight others.

Edward Thomas Mann, 38, reportedly had a personal vendetta against IBM stemming from a legal claim charging IBM with discrimination in January 1977. Mann, who is black, was quoted by *The New York Times* as saying that IBM "is very prejudiced, [but] they disguise it in a very business-like way."

Mann was armed with two rifles, a shotgun and a pistol when he drove his bronze Lincoln Continental up a loading dock in the back of the building, smashed through two sets of glass doors and burst from the automobile in the first-floor lobby area of the office building at about 11 a.m.

The majority of the approximately 750 office workers in the building were evacuated in seconds, after someone set off a fire alarm.

The two persons killed during the incident were Hung Phi Nguyen, 40, of Silver Spring, Md., a programmer analyst, and Larry Lewis Thompson, 56, of Vienna, Va., an industry administrator at the company.

IBM refused to comment on the presence or location of the company's security guards during the

melee.

Mann, who is reportedly from Mitchell, Md., approximately 30 miles away from the site of the crime, had worked for IBM for 12 years as a marketing representative before resigning two years ago. In January 1977, two years prior to his departure from the company, he had filed a complaint with the Washington, D.C., Office of Human Rights that was later dismissed.

One Request

Mann made only one known request to the authorities during the seven-hour ordeal: to fire several shots at a picture depicting a courtroom scene that was hanging on the wall of a third-floor office.

When asked for comment on the Mann case, an IBM spokesman said: "In January of 1977, Mr. Mann filed a complaint alleging discrimination. In April 1977, the Washington, D.C., Office of Human Rights dismissed his complaint with a finding of 'no probable cause.' Mr. Mann continued to work for IBM for two years. IBM has no record for a Workmen's Compensation claim for Mr. Mann. We know of no other legal actions brought by Mr. Mann against IBM."

Asked if there were any corporate policies to help IBM employees with stressful situations or psychological problems, IBM said, "We have all kinds of channels for employee grievances, including our 'Speak Up'

program, which allows for comments and opinions to be anonymously submitted; communication with the immediate manager; executive interviews; employee opinion surveys; and the 'Open Door' policy, which enables an employee to take a problem to any level of management within the company."

IBM also said it provides both medical and career counseling as needed, but the company declined to reveal whether Mann received counseling of any kind during his tenure with IBM.

Ken Branch, president of the National Black Workers Alliance of IBM Workers, said the organization was not prepared to issue any statement on the Mann case, but was planning to hold a meeting on the subject late last week.

Held Without Bail

Mann is being held without bail at the Montgomery County Detention Center on preliminary charges of one count of murder and one count of assault with intent to murder.

Further charges are pending and will be brought before a grand jury in about two weeks, according to the Montgomery County State's Attorney's Office.

Washington attorney Kenneth Mundy was retained by Mann's family to defend him. Mundy, contacted by telephone last week, refused to comment on the case.

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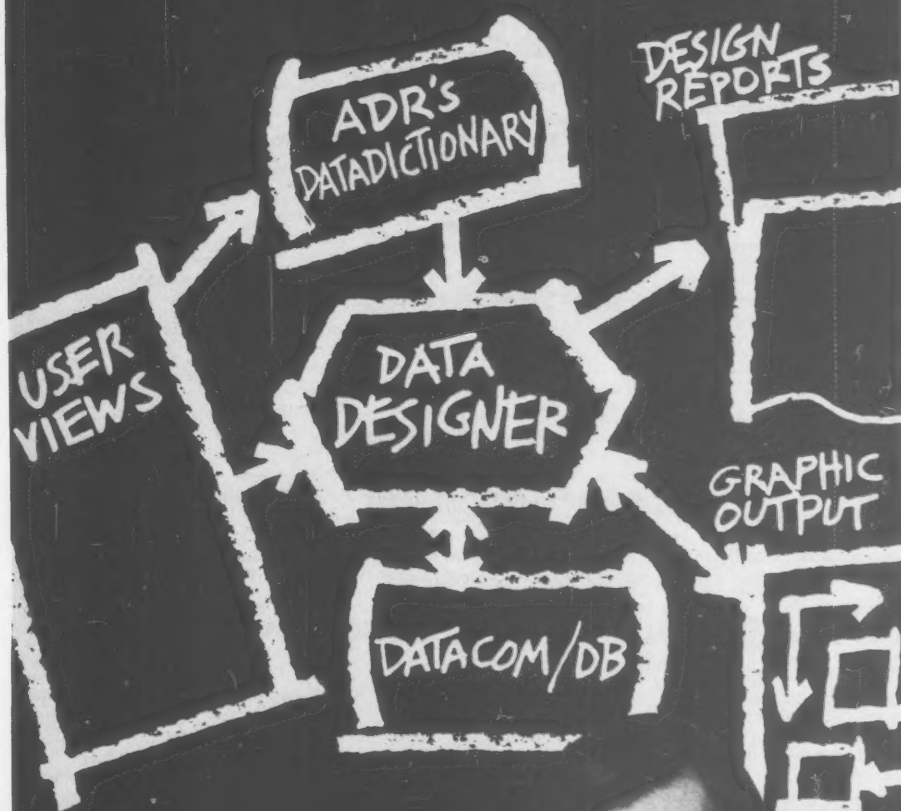
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WIP: Female, Male DPer's Getting Equal Pay

By Lois Paul
CW Staff

RALEIGH, N.C. — There is no statistically significant difference between the salaries of male and female programmer/analysts, senior systems analysts or marketing support persons.

That is a "sneak preview" of the results of a survey being made by Women in Information Processing (WIP). The preliminary survey results, based on a 10% random sampling of more than 10,000 returns, were presented at a recent conference here by Janice H. Miller, international president of WIP.

Although the full results of the survey will not be disclosed until September, Miller felt that important conclusions can be drawn from the preliminary results because response rates are running higher than 90%.

Faster Progress

"Women are now entering the industry in greater numbers and making faster progress than previously recognized," according to Miller, and the positions in which there are no statistically significant differences between men's and women's salaries account for the majority of DP jobs.

"While statistically significant differences do exist in such areas as systems programming manager, technical services manager and marketing manager, further research will be required to determine the reasons," she added.

"Women overwhelmingly believe we're on the right track," Miller stated. She pointed to the 86% of the respondents who believe there are more opportunities for women to move into top positions today than five years ago and that the trend will continue during the next five years.

Grade of 4.6

"On a scale of one to five," Miller said, "respondents graded their jobs

| | Commercial Programmer 4+ | Senior Systems Analyst 6+ | Systems Programming Manager | Technical Services Manager | Marketing Support Rep. 4+ | Marketing Rep. 6+ | Marketing Manager 6+ |
|--|--------------------------------|------------------------------------|-----------------------------------|----------------------------------|------------------------------------|-------------------------|----------------------------|
| Years Experience | | | | | | | |
| Installation | | | Medium | Large | | | |
| Median Salary (Thousands of Dollars) | | | | | | | |
| WIP | 27.5 | 35.0 | 37.0 | 39.0 | 32.5 | — | 43.0 |
| Source EDP | 29.8 | 36.9 | 41.5 | 46.1 | 33.8 | 41.5 | 56.5 |
| ATTITUDES— | | | | | | | |
| 1 Strongly Disagree | 2 | 3 Neutral | 4 | 5 Strongly Agree | | | |
| The work is interesting and challenging. | 4.2 | 4.4 | 4.0 | 4.8 | 4.7 | 4.9 | 4.4 |
| There are ample opportunities for technical training. | 4.5 | 2.9 | 2.6 | 3.2 | 4.5 | 3.9 | 3.2 |
| Women have the same opportunity as men to move into top positions at my organization. | 2.9 | 2.7 | 2.3 | 2.8 | 3.5 | 2.9 | 3.0 |
| PERCENT ANSWERING 'YES' | | | | | | | |
| I enjoy working more with equipment or software than with people. | 16% | 23% | 0% | 33% | 0% | 0% | 0% |
| Women today can more easily move into top positions than they could five years ago. | 84% | 77% | 100% | 83% | 100% | 100% | 80% |
| In five years, it will be easier for women to move into top positions than they can today. | 84% | 62% | 100% | 83% | 100% | 71% | 80% |
| Women have the same opportunity as men to move into top positions in the industry. | 16% | 8% | 0% | 0% | 33% | 29% | 33% |

Sample Abstract From the WIP '82 Survey

4.6 when asked whether their jobs were interesting and challenging."

Loyalty to their firms appears to be a strength among the women respondents, according to Miller, who noted that "while less than 29% of

the respondents polled believe women have the same opportunity as men to move into top positions in the industry as a whole, the respondents were essentially neutral when asked about the same opportunities within

their firm."

WIP Survey '82 is available for \$2 to cover mailing and handling (\$4 if ordered after July 15) from WIP Survey '82, Suite 9, 1000 Connecticut Ave. N.W., Washington, D.C. 20036.

NCC Blasts Off Today; Olson Keynoter

(Continued from Page 1)

plications; office systems; management issues/decision support systems; language and data base processing; applications of computing; and Pioneer Day.

In addition, half-day and full-day Professional Development Seminars

will be held down the road at the Shamrock Hilton Hotel.

NCC '82 keynoter Olson began his career in 1944 employed as a splicer's assistant with the Bell system's Northwestern Bell Telephone Co. in North Dakota.

Olson became executive vice-presi-

dent of AT&T in 1977 after rising through the management ranks of various Midwestern Bell operating companies.

Olson is currently responsible for organizing the companies through which Bell will market its products and services.

Other Speakers

Olson is the first of four notables who will address NCC '82 this week. Tomorrow, at NCC's first plenary session, Theodore A. Burtis, chairman and chief executive officer of the Sun Co., will ask "First Violin or Second Fiddle?"

On Wednesday, Gordon C. Morrison, assistant postmaster general of the U.S., will speak at that day's plenary session on "Computer-Originated Mail and the Postal Service."

On the final day of the conference, Dr. Ruth L. Davis, former director of the National Bureau of Standards' Institute for Computer Sciences, will offer "A Computer Antidote for Our Economic Ills."

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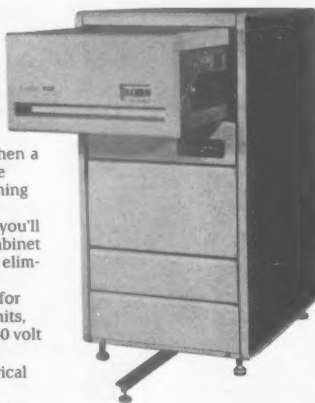
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Correction

The product announcement entitled "WP Software Out for DPS 6" [CW, May 17] stated that the Independent Computer Systems WP 400 Word Processing System requires 32K words for the first terminal and 64K words for each subsequent CRT terminal. For each subsequent terminal, 6K words are actually required.

Survey Conducted With Micros Show-Goers Button-Holed, List OA Hurdles

By Tim Scannell
CW Staff

BOSTON — Management resistance to change, gut-level fears and the terror of retraining are three principal barriers that office automation will have to overcome to make it in today's organizations.

Vendors will also have to make their systems more affordable and less complicated if they are to be easily accepted.

These are a few of the findings of a survey conducted here late last month at the Electro/82 electronics show and convention. The show was sponsored jointly by the Institute of Electrical and Electronics Engineers (IEEE) and the Electronics Representatives Association.

Rather than resort to the typical survey tools of handout questionnaires or personal interviews, the show's sponsors queried people by using eight Apple Computer, Inc. microcomputers that were set up at various points on the show floor. At any time during the three days of the show, attendees could walk up to one of eight computers and answer up to 80 questions that focused on office automation. The questions were broken down into seven categories that included personal computers, local-area networks and applications.

By calling up graphs, users could also see how other users answered questions on a specific microcomputer. Roland Alden, a senior software engineer with Basic Four Corp. and co-developer of the Electronics Questionnaire, explained.

Eighteen Hundred Participants

More than 43,000 people attended the convention, which is considered to be the electronics industry's largest. However, because of the limited number of terminals and the time involved in answering the questions — about 15 or 20 minutes — only about 1,800 participated in the electronic survey. Approximately 500 of these people spent enough time at a microcomputer to answer all the questions in a single category, and about 300 of these attendees qualified as "legitimate respondents" by completely answering every question, Alden said.

Most of the engineers who took part in the survey believed that office automation had a great deal of potential. However, a significant number (200 out of 326 that answered this question) spotlighted price and ease-of-use as important issues that might affect the future of the automated office. This same group saw standardization and compatibility as vital issues.

More than 40% of the 102 people who answered a question concerning the greatest barrier to the organizational adoption of office automation cited management resistance. Nearly 30% noted a fear of retraining and 22 people pointed to "gut-level fears" as the leading roadblock.

A significant number of users thought that what most office automation systems offered in terms of sophisticated technology often led to a lack of "user friendliness." Nearly 40% of the 273 people responding to a question posed on user friendliness

thought today's systems were in need of a lot of improvement. About 30% thought current systems are difficult, but acceptable, and an equal number believed today's systems are well designed, the survey noted.

Focusing on the results realized from office automation, 94 out of 237 people at Electro/82 reported a "fair" amount of progress. However, 46 observed a lot of resistance and 22 users answered that their offices are now in worse shape than when they first began automating with computers.

More than one-fourth of the 402 people queried on office automation's biggest drawbacks cited too much computer dependence as a

problem. About 60 checked off dehumanization and alienation as minuses, while 108 pointed to unemployment, the ability to monitor work loads and job fragmentation as drawbacks.

Looking at the efforts of their own companies to adopt office automation, 127 out of the 256 people who answered this question felt they should have put more time into planning requirements. Conducting an effective feasibility study of their organizations needs was next, followed by training specific people, preparing for the change and searching out qualified vendors.

Finally, about 40% of 275 people

queried believed that it will be at least three to five years before more than half the office workers in an organization will have personal computers on their desks. Fifty-nine respondents opted for a six to 10 year time period and 30% of those polled on the personal computer question answered "probably never."

However, when asked when they thought executive workstations would be as common to the office as the telephone, 70% of the 175 people polled answered from three to 10 years. Thirty-five people believed this will happen in from one to two years and less than 5% could never see it happening, the survey stated.

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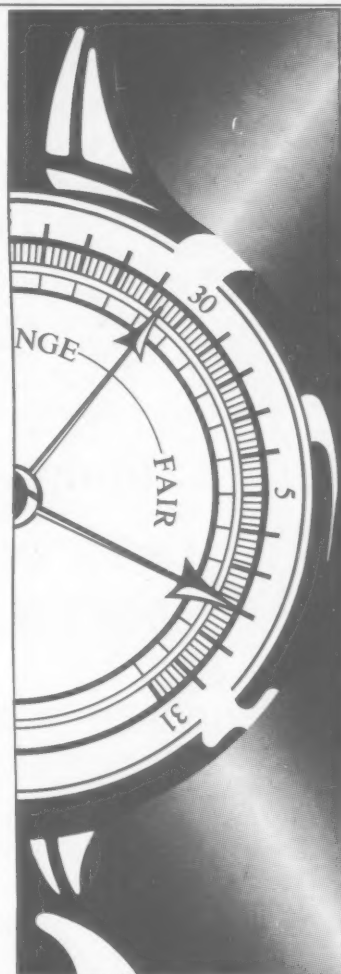
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Police Nab Chief Suspect in Monolithic Theft

By Jeffery Beeler

CW West Coast Bureau

SAN JOSE, Calif. — Police apparently broke a major Silicon Valley chip-stealing business late last month when they recovered more than \$3 million worth of pilfered components and arrested one of the operation's alleged ringleaders.

The microcircuits, which disappeared during the largest electronics heist in Silicon Valley's history, were found in a rented storage locker that allegedly had been used by Larry Kizer, one of the area's suspected chip-theft kingpins.

The locker — located in South Lake Tahoe, Calif. — was opened and searched by police on May 28 as part of a joint investigation involving FBI agents and Santa Clara County Sheriff's Department officers.

Kizer, vice-president of a local distributorship known as Brut Electronics, Inc., was later arrested and charged with grand theft, conspiracy and receipt of stolen property.

Kizer's arrest "has probably broken the back of what we believe is perhaps the valley's most significant [high-technology] fencing operation," according to sheriff's department deputy Pat Moore.

Monolithic Theft

With the help of his reputed partner-in-crime Larry Lowery, Kizer allegedly masterminded the heist of more than 500,000 Monolithic Memories, Inc. semiconductors, valued at

\$3.2 million [CW, Dec. 7, 1981].

The theft, which still ranks as the largest of its kind in Silicon Valley's history, took place late last November, shortly after Lowery was found guilty of possessing \$100,000 worth of stolen Synertek, Inc. circuits. Although no charges have been filed yet against Lowery in the Monolithic Memories case, local authorities seem unlikely to restrain themselves much longer.

Lowery, who has already received a two-year prison sentence for his role in the Synertek heist, has been behind bars since mid-January.

Suspected of More

In addition to the Monolithic Memories theft, Lowery and Kizer are suspected of having engineered many other electronics-related ripoffs. "A large majority" of the pair's alleged crimes appear to have been directed against National Semiconductor Corp., Moore said.

Stolen National Semi parts were said to have been found in the same public storage locker as the missing chips from Monolithic Memories.

The roots of the \$3.2-million chip-theft case go back to last Thanksgiving weekend when a group of thieves bypassed Monolithic's elaborate security system, broke into a supposedly theft-proof storage bin and took enough advanced microcircuits to fill a small truck.

From the company's headquarters in nearby Sunnyvale, the devices were then moved by rented van to the Tahoe area. The van was allegedly signed for by Lowery himself, "which was kind of dumb," Moore said.

In Tahoe, the chips were transferred to a public storage locker rented under the name of a Reno, Nev., real estate firm that was later linked to both Kizer and Lowery. Police have reportedly uncovered no evidence implicating the company in any illegal semiconductor dealings.

But when the locker and its ties to the Reno firm were finally discovered, police organized a raid and had the storage compartment opened. What they found was reportedly an estimated \$4 million worth of purloined electronics, most of which

consisted of the Monolithic Memories and National Semi parts.

Police also found seven stolen IBM Personal Computers and an equal number of Apple Computer, Inc. Model IIIs. That latter finding raises the "possibility" that Lowery's and Kizer's alleged misdeeds may be connected somehow to a recently discovered theft ring that fleeced Apple of up to \$1 million worth of hardware, Moore said [CW, May 24, 1982].

The stolen Monolithic Memories chips had apparently remained in the Tahoe storage locker for almost the whole six months since they first disappeared. Originally, the thieves had probably intended to sell the parts to "anyone who would buy them," Moore said, but continuing publicity about the \$3.2 million heist made the pilfered property too "hot" for even the bravest buyer to handle.

"We kept up pressure on all the gray market areas to see if we could pick up any rumors about what had happened to the stolen Monolithic chips, but apparently no one wanted to touch them with a 10-foot pole," Moore said.

DP Managers Detail Impact of Recession

(Continued from Page 1)

for programming jobs are hard to find; however, not much harder than in previous years.

Banking and insurance industries appear the least impacted by the re-

cession. As one manager put it, both those industries tend to be computer-driven and cannot afford not to keep up to date with technology.

H. Alfred Colby, senior vice-president for DP at John Hancock Insurance Co. in Boston, said finding qualified personnel has been a bigger challenge than the recession.

Colby said John Hancock actually increased its 625-member DP staff during the past year. In some cases, jobs have been easy to fill with out-of-work teachers and other professionals that have been impacted by the recession, but qualified personnel for more specialized jobs have been difficult to come by, Colby said. George Dinardo, senior vice-president for information processing at the Pittsburgh-based Mellon Bank, one of the nation's largest, said his department is "indifferent to the recession." Operating on the premise that the computer operation is the main production arm of the banking industry, Dinardo said "the handwriting is on the wall" that the DP department would be spared in hard economic times.

The economy has not affected the banking community seriously enough to force the issue, Dinardo noted.

Caterpillar Not So Lucky

Other industries have not been quite as lucky. Caterpillar Tractor Co., manufacturers of heavy construction equipment, has been forced to institute a companywide hiring and salary freeze as a result of a drop-off in the construction industry. In addition, the company has laid off some salaried, management personnel, but a spokesman insisted the layoffs have had little or no effect on the DP operation.

In spite of the problems facing Caterpillar, the firm has yet to cut back on some long-range data processing plans. A spokesman said a computer-aided engineering project, for exam-

ple, is still under development.

However, Caterpillar insists it is not giving its DP department special treatment. Everyone suffers, the spokesman said; it's just a matter of degree.

In spite of economic problems that have plagued airlines, Miami-based Eastern Airlines DP operation has had a 1% to 2% increase in DP personnel. While Eastern does not have a hiring freeze in effect, there has been a salary freeze in effect since the beginning of 1982.

Eastern's Vice-President of Computer and Communications Services Frank Heinzman said that for the most part the DP operation has received the same treatment as the rest of the Eastern operation. However, there seems to have been a slight improvement in DP services.

All the managers polled said current conditions would either get better or remain about the same in the first part of 1983. Most, however, did not have concrete information to support their contention. In any case, the managers expected little or no change in their operations.

Other managers have yet to find out how things will be next year. Some firms are now preparing budget proposals for the 1983 budget. Whether those proposals will be approved has yet to be decided.

Confident About Budgets

Most of the managers polled were confident their budgets would be approved.

The Caterpillar spokesman, for example, said the heavy machinery firm still expects to follow through with long-range DP expansion plans.

David Billings, director of systems at Airborne Freight, a Seattle-based overnight delivery service, said some of his long-range projects have been postponed for more pressing short-range programs. However, the DP manager maintained the firm's long-range plans were not altered.

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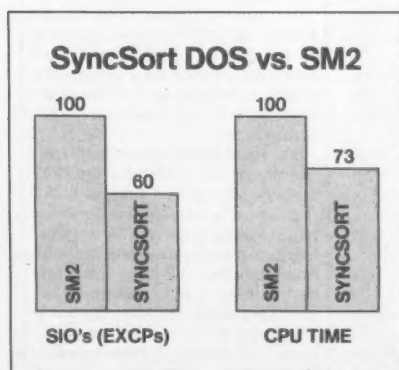
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Software Patents Growing

(Continued from Page 1)

[CW, April 27, 1981], the door has been opened to some of the software firms that had long been seeking patent protection for their products.

"The [U.S.] Patent Office had been the traditional foe of software patent applications," according to Susan Nycum, an attorney with the firm of Gaston, Snow, Ely and Bartlett here.

EDS Acquires Braniff's DP

DALLAS — Electronic Data Systems Corp. (EDS) has formally announced that it is assuming bankrupt Braniff International Airline's airline reservations and other DP services.

EDS has acquired all licensing and marketing rights to Braniff's software systems, as well as its DP contracts and assets, an EDS spokesman said. Included in the agreement is the Cowboy reservations system that provides DP services to 25 commuter airlines.

EDS will occupy Braniff's data center in the Dallas-Fort Worth airport under a one-year lease and will use two of Braniff's three currently installed IBM 3033 CPUs, he added.

In addition, 43 former Braniff DPers have joined the EDS staff, including Braniff's former vice-president of computer services, Norman McCue. Most of the new employees were part of the Braniff DP management team, EDS noted.

"Following the Diamond vs. Diehr case, the Patent Office has simply gone 180 degrees. They are being very friendly and receptive to these applications."

"The trend is definitely toward, in the appropriate cases, trying for patent protection," she continued, "because, after all, it is the one that offers protection for the idea, coupled with disclosure."

Nycum's feeling is that a number of people are seriously investigating the patent option, but are doing so very quietly. They do not want to draw attention to a patent application because this may prompt someone to attempt to test their patent.

Although Nycum acknowledged an increasing trend toward patent protection, she cautioned that this is not the appropriate route for every software firm. "Remember that it is expensive and there are certain tests that have to be met in order to have a patent issued. Then you have a chance to police the infringements and run the risk that 50% of the time the patents are held invalid."

Gareth Shaw, supervisory patent examiner with the Patent Office in Washington, D.C., agreed that last year's Supreme Court decisions have been "one of the major signaling factors in so far as the publishing community has viewed the current state of the patent law. So I expect we are going to be seeing quite a few cases from a number of companies and individuals on the programming issue."

'Easytrieve' Patent Granted Eleven Years After Filing

By Lois Paul
CW Staff

OAK BROOK, Ill. — Pansophic Systems, Inc. is one firm that recently obtained a patent for its Easytrieve software product. The company appears to be regarding the patent as nice to have, but something that needs firm backing up with tougher forms of protection.

The patent was obtained on Jan. 5, 11 years after Robert Beckler, the original author of Easytrieve, filed for it. Pansophic acquired all ownership rights to Easytrieve in December 1979 and thereby inherited the now-successful patent application.

The patent for Easytrieve was issued directly as a result of last year's U.S. Supreme Court rulings [CW, March 16, 1981] that indicated "inventions that rely in part on software or firmware are not necessarily unpatentable," according to Joseph A. Piscopo, chairman of the board and chief executive officer for Pansophic. Although the Supreme Court's decisions did not reverse its earlier rulings that computer programs are not patentable, they did mean that inventions using software or firmware cannot be denied patents solely on that basis.

The Easytrieve patent application had been rejected by the U.S. Patent Office and had lay dormant for seven years, Piscopo explained. "It was reversed without any basis for the computer side of it, but rather because it had been rejected by grounds later determined to be voided."

Firm Believer

Although Pansophic would not, on its own, have pursued patent protection for Easytrieve, Piscopo has become a believer in the inherent protection capabilities of patents for software products.

"I am not trying to say I think it is a great specific consequence at present, but I think it has a great deal of validity in the context of some areas that are not covered specifically by other law," he said.

The firm probably will not attempt to patent its other software offerings, although Piscopo hesitated to rule out this possibility for the future. "We don't want to become the first one to test the issue of infringement," he said.

Currently, he is circulating internal memos to his employees to keep them posted on the meaning of the Easytrieve patent. He explained that Pansophic does not have a copyright for Easytrieve, although its user manuals and written materials are copyrighted.

"We rely heavily upon trade secrets and contracts. We have a very legally enforceable contract for all customers for any licensing of the product," he said. Pansophic also has extensive employment contracts to protect the company's ownership rights to any trade-secret-protected information with which employees might become involved. "We believe very strongly that both our customer contracts and employee confidentiality agreements are enforceable and strongly so," Piscopo said.

The patent protection for Easytrieve applies to any unauthorized

use of the Easytrieve data retrieval and compiler process techniques, Piscopo explained. The patent, which protects the Easytrieve process, rather than its source code, also would be infringed if a copy of the source or object code served as the basis for conversion to a different programming language or a different computer environment, Piscopo continued.

Not That Expensive

Piscopo took exception to charges from California attorney Susan Nycum and others that obtaining a patent is an expensive proposition. "It does not cost \$100,000 to get a patent. It probably costs about \$10,000 to \$15,000 at today's rate. I'm sure the developer of Easytrieve did not spend more than about \$5,000 to \$10,000 in 1971 to put this all together." He admitted, however, that a patent infringement case would cause a great deal of expense.

Robin Robinson, president of the Association for Software Protection and legal administrator for Micro Business Software, Inc. in New Hampshire, said she and other attorneys active in this field are still encouraging trade secret and copyright protection, rather than patents.

She said she could understand Piscopo's reservations about copyright protection. "I think that no company can feel fully secure with the copyright argument until it gets the decision from the judge, and there is so much difference between how judges are going to look at it. Because of that vagueness, you tend not to have a lot of faith in it."

How to Get DP for Less?

At the same time that top management is expecting more and more from its DP department, there is also a drive to cut costs. That means DP and management information systems managers are being asked to hone the company's competitive edge to ensure greater revenues and, at the same time, reduce costs to ensure profitability.

The July 26 *Computerworld* special report, "More DP for the Dollar," will be geared toward helping DPers maximize productivity while saving money. CW is looking for tutorials, studies and application stories that can help DP shops realize that elusive goal.

Possible topics include the pros and cons of third-party maintenance and leasing; service bureaus vs. in-house computers; and micrographics vs. optical disks.

You could also write on how to select consultants, service bureaus and computers.

Manuscripts in the form of four to eight typed, double-spaced pages should be sent by June 15 to Bruce Hoard or Marguerite Zientara at CW Editorial Department, P.O. Box 880, 375 Cochituate Road, Framingham, Mass. 01701.

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Joint Effort by Interlan, Tech Concepts

Another Decnet Link to Ethernet Announced

By Bruce Hoard
CW Staff

BOSTON — Interlan, Inc. and Technology Concepts, Inc. have unveiled Ethernet-compatible hardware and software for users of Digital Equipment Corp. processors linked by the Decnet protocol.

Etherway, claimed to be the first interconnection product between Decnet and the Ethernet local-area network, was developed by Technology Concepts and will be marketed by Interlan. It was announced a week after DEC announced its plan to link Ethernet and Decnet [CW, May 24].

When used with the appropriate Interlan Ethernet communications controller, which was also introduced, Etherway reportedly allows Decnet computers under Phase III of DEC's Digital Network Architecture (DNA) running DEC RSX-11M and VMS operating systems to access Ethernet systems.

An Interlan spokesman said the Etherway products feature high reliability via the support of multiple Interlan controllers and Ethernets among Decnet nodes. Support for simultaneous communications with non-DEC devices on Ethernet is also provided.

Etherway interfaces Ethernet as a data link and physical link module within Decnet. Full Decnet Phase III

IBM Asks Court To Put Muzzle On Edelstein

NEW YORK — IBM asked a federal appeals court here recently to stop Judge David N. Edelstein from conducting any further proceedings concerning the U.S. vs. IBM antitrust case.

In an extraordinary petition filed with the appeals court May 27, IBM requested that Edelstein "cease immediately all proceedings purporting to be part of, or involving, the parties and issues in U.S. vs. IBM." The case was dismissed Jan. 8.

The company asked the appeals court to issue a writ of mandamus barring Edelstein from holding further hearings of any kind concerning the case. IBM also asked that previous orders directing the government and IBM to preserve case documents be rescinded.

IBM said it was forced into filing the petition with the higher appeals court as a result of Edelstein's refusal to disqualify himself from the proceedings. The company's request was made at a post-trial hearing May 19 that was set by Edelstein to determine if the Tunney Act, which allows for public scrutiny in antitrust settlements, could be applied [CW, May 24].

The case was not settled, however, but dropped by the government's antitrust chief, William F. Baxter.

Another hearing is scheduled for June 21 to look into whether Baxter should have disqualified himself from the case because of consulting work he did for IBM [CW, March 8].

function is preserved, including network routing over all channels including the Ethernet, network management and control, remote VMS terminals and file access/transfer capability, said the spokesman.

In its announcement, DEC said similar capabilities for Decnet under Phase IV of its DNA will be available sometime within the next three years.

Etherway/VMS shipments will begin this August; the software will cost \$3,500/node. RSX shipments will begin in September and cost \$2,500/node.

Interlan also unveiled its second generation of Ethernet controller

boards for Unibus, Q-bus and Multibus. The "A" series is based on the NM10A Ethernet protocol module, an enhanced version of the NM10. The module is incorporated in the NI1010A Unibus, NI201A Q-bus and NI3010A Multibus Ethernet communications controllers.

The new module is compatible at the electrical, mechanical and programming interfaces with its predecessor, the NM10. However, it offers over 30% greater throughput performance, contains several new programming features, requires 30% less power and costs 44% less, the spokesman claimed.

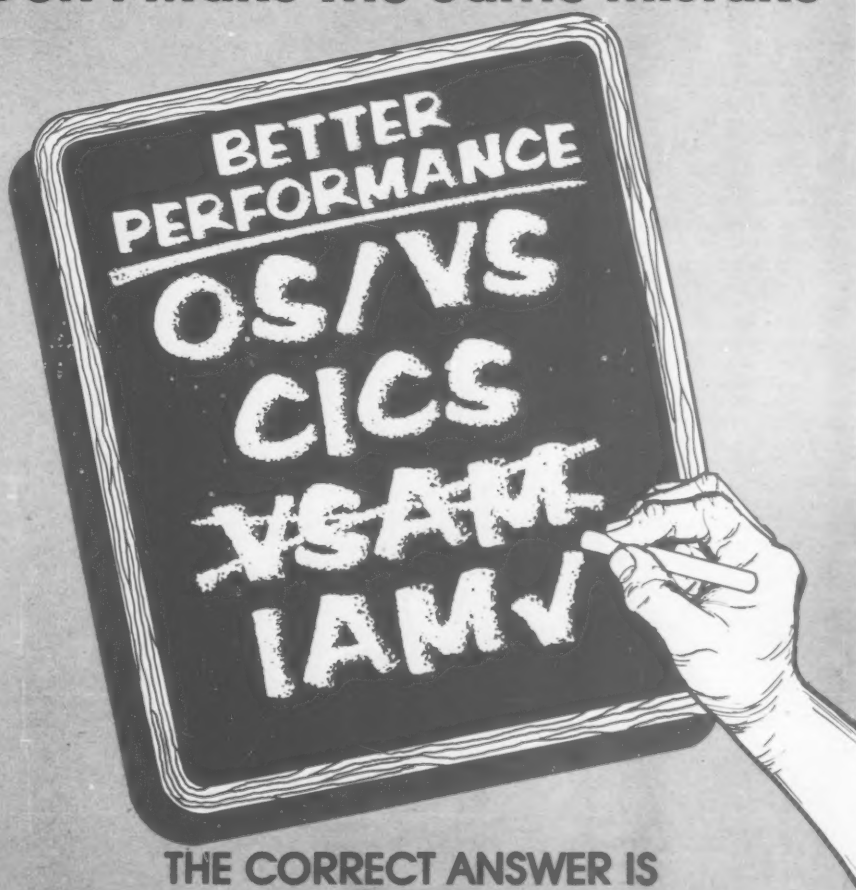
The NM10A is an intelligent mod-

ule that contains all of the data communications logic required for interfacing microcomputer and minicomputer systems Ethernets. It implements the Xerox Corp./Intel Corp./DEC Ethernet specifications by performing all the data link and physical channel functions required, Interlan said.

The NM10A costs \$1,290, down from \$2,300 for the NM10. The NI1010A Unibus, NI201A Q-bus and NI3010A Multibus cost \$3,190, \$2,290 and \$1,890, respectively. Those prices are down from \$3,900, \$3,500 and \$2,990.

Interlan is located at 160 Turnpike Road, Chelmsford, Mass. 01824.

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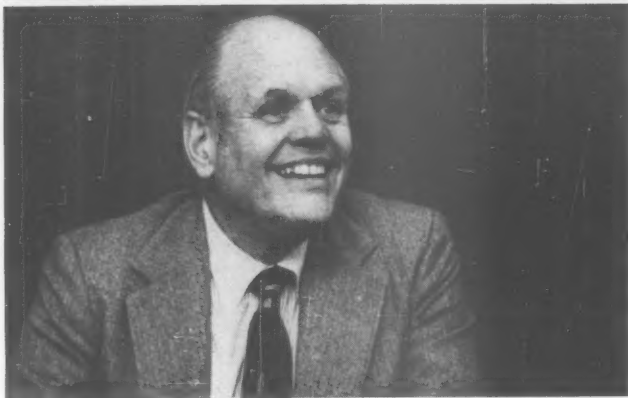


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Ken Olsen

Digital Equipment Corp. will celebrate its 25th anniversary in August. The driving force behind the emergence of DEC from a three-man operation to one of the largest companies in the computer industry has been Kenneth H. Olsen, the firm's first and only president.

Olsen earned his bachelor of arts and master of science degrees in electrical engineering from MIT. Prior to founding DEC, he was on the staff of MIT's Digital Computer Laboratory for seven years.

Recently, Computerworld's Marcia Blumenthal interviewed Olsen to discuss his views on the industry.

are dependent on them. The quality of the machine is almost dependent on how much soft-

ware is generated for them. But the large growth could possibly be in the VAX.

CW: Your company appears to be relatively immune from the downturn in the current economy, whereas other minicomputer vendors are running into trouble in the current downturn. How do you manage this?

Olsen: Our business is very dependent on the economy. If people don't buy computers, they don't buy computers. But we try to soften the effect of a downturn by predicting it ahead of time. We've been getting ready for

this recession for two years.

We do this by becoming more efficient and by realizing that good times don't last forever. We invest tremendously in keeping our products modern. When we grow fast, we try to be conservative in our financing, always raising capital before we need it and we have very little debt.

Supposedly, it's more sophisticated to borrow money, but this can be dangerous in a recession. You will make more money by borrowing, especially in a time of inflation and growth, but if you are willing to be cautious

CW: What major changes have you seen in the industry in the past 25 years?

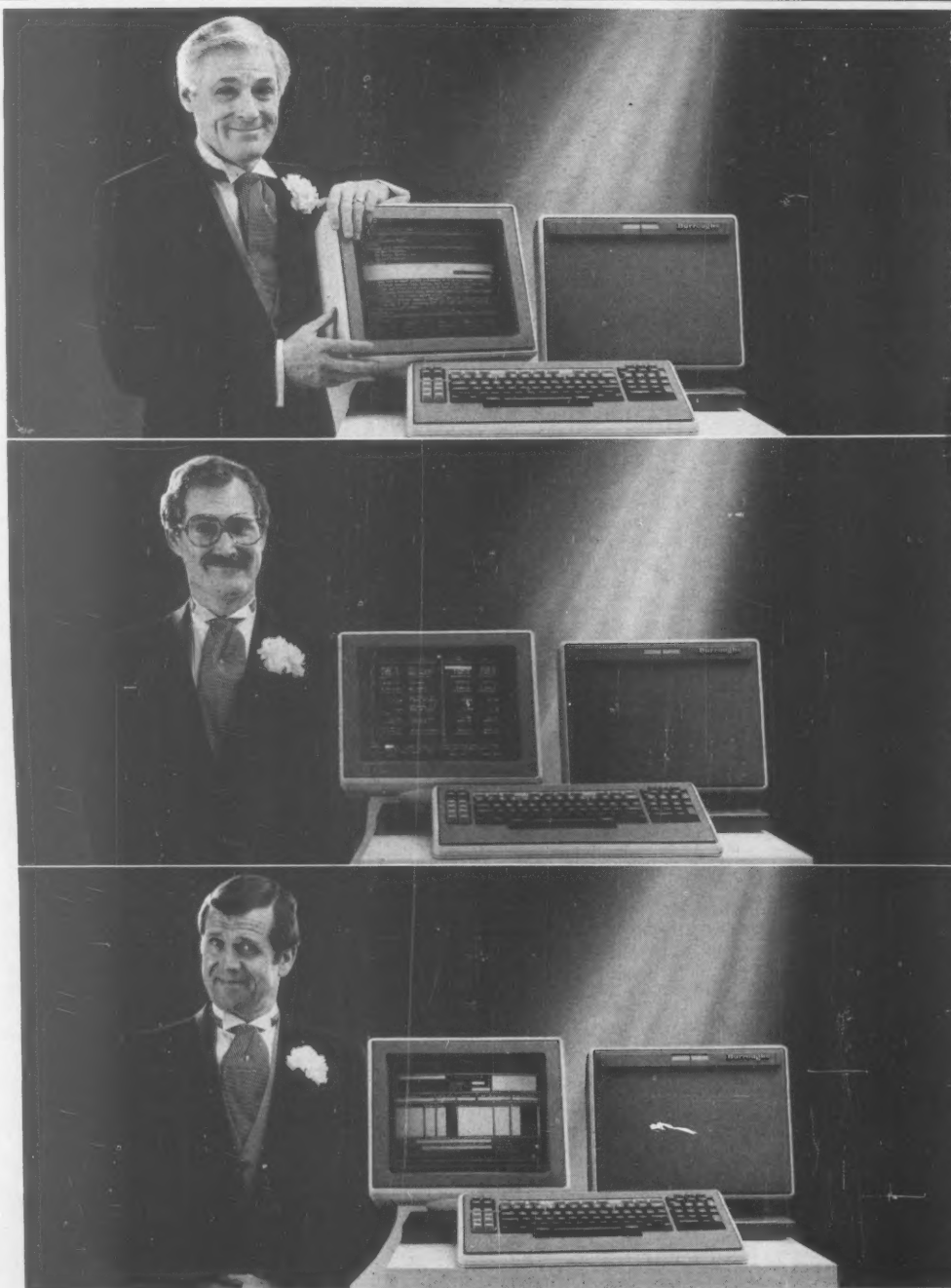
Olsen: It doesn't seem like 25 years have passed. We used to do everything ourselves. We made our own printed-circuit boards, etched the boards in aquarium tanks purchased in the five-and-ten-cent store. I was the closest thing we had to a machinist, so I made the tools. But from a hardware point of view, the integrated circuit was the most significant invention. But that development evolved slowly, a lot slower than people expected.

CW: What was the philosophy behind founding DEC?

Olsen: We took several ideas from MIT's Whirlwind computer. The idea that computers should be interactive and, therefore, fast and simple was the basis of the company. Some people thought working with a computer you could interact with and have fun with was wrong. Another idea that originated at MIT was computers should have high-speed complex circuitry instead of simple circuitry with complex mathematical arrays. Most people did not understand this idea.

CW: Now that there are powerful 32-bit minis and micros, is the 16-bit minicomputer, the mainstay of your company, a device that will become extinct?

Olsen: No, no, no! Just like the 12-bit systems, the 16-bit machines don't die. There is so much software for these systems that peo-



DEC's President Ken Olson

and sacrifice [making more money] it's nice in a time like this.

CW: Is this recession different from the one that occurred in 1973-1974?

Olsen: Yes. We were sure the earlier recession would turn around soon. We are not quite sure when this one will turn around; it may be immediately or a very long time.

CW: Your company's organization has been described as a matrix structure — an organization

with unclear reporting lines and seemingly informal independent groups. Is this structure appropriate for today's computer industry environment where product life cycles are getting shorter and shorter?

Olsen: I don't believe in the term 'matrix management.' 'Matrix' has a meaning, and I think it is very good. Under this system you pick people from different parts of the company to work on a project, but they retain ties to their departments.

The way we operate here is to break down the company into

many products, each autonomous and protected rather than independent. If you have centralized planning, at most only three products can be favorites. We have 18 product lines.

CW: But isn't this a slow way to do things?

Olsen: We've had some miracles in product development in the past year — the personal computer, for one. I try to make sure people with ideas take responsibility for what they are doing. It is more and more important that the people with the knowledge of the technology are in

the position to make the proposals, which is almost the same as making the decisions. For example, the capital investment for semiconductor design and simulation for a system is fantastically large. The capability of people (involved in specific projects) to conceive this from a technical and management point of view is much more than you can expect from a top-level boss.

CW: What is your view of office automation?

Olsen: OA, in general, is very simple. It's electronic mail, word processing and electronic filing. Very few offices integrate figure processing with word processing, so integrating data processing with office automation is a little dreamy — it's not the big thing.

With the personal computer you can do applications like modeling or graphics, but those are not the things that will revolutionize the office. But the personal computer can do office automation [applications].

CW: How do you see personal computers fitting into the DP structure of the organization?

Olsen: How companies will use these smaller computers hasn't been figured out yet. A lot of computation should be done locally by separate small machines and a lot has been done in this regard already, but distributed data processing implies fast interaction with a central computer. But so many things in business don't need interactions. Much of the information transfer can be eliminated.

One interesting thing is that a personal computer with a letter-quality printer is becoming cheaper than shared systems. Very few people want to share their files.

CW: Your firm was the first major computer company to open its own retail stores. What have you learned from the retailing experience?

Olsen: At that time we didn't start out to make the stores big deals as we were only selling one product. We learned how to deal with low-end customers.

We also learned about service. Our first store was in New Hampshire, one of the most industrialized states, with 20,000 small businesses. The first question people ask is about service. People know how much service costs and most are willing to pay for it. It depends on how they view their time.

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Burroughs

Building on strength

Analysts, Programmers Seen Topping Job Mart

By Jim Bartimo
CW Staff

WASHINGTON, D.C. — There will be about 100,000 more jobs for systems analysts and as many as 110,000 more jobs for programmers by 1990, according to a report recently released by the U.S. Department of Labor's Bureau of Labor Statistics (BLS).

Employment of both systems analysts and programmers will increase faster than the average for all occupations in this decade, the BLS said in the 1982-1983 edition of the "Occupational Outlook Handbook."

The average projected increase for all occupations will be between 17.1% and 25.3% during the 1980 to 1990 period, the Labor Department predicted, but the increase for systems analysts and programmers will be even greater.

Employment for systems analysts will increase by 50% or more while employment for programmers will increase by 28% to 49%, according to the report.

The handbook reported that in 1980, there were 205,000 systems analysts and 228,000 programmers.

Rising Demand

For analysts, "employment in data processing firms may not grow quite as rapidly as in recent years as more small businesses install their own computers rather than rely on a data processing service," according to the study. "This will be offset, however, by a rising demand for analysts to design systems for small computers that are specifically adapted to meet problem-solving needs of small firms," the study explained.

While there will be an increase in the need for programmers, the overall need will not be as great as in the past, according to the handbook. "Improved software, such as utility programs that can be used by other than data processing personnel, will simplify or eliminate some programming tasks," the report said.

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"More systems programmers will be needed to develop and maintain the complex operating programs made necessary by higher level computer languages, as well as to link or coordinate the output of different computer systems."

Systems analysts in 1980 earned more than twice as much as the average for non-supervisory workers in private industry, the handbook

said. Experienced analysts earned from \$390 to \$460 weekly in 1980, while a senior analyst earned \$490 weekly.

Experienced system programmers earned about \$470 per week, while application programmers earned about \$400 weekly. Top-end earning for a programmer was about \$505 weekly, the report said.

Higher salaries for both an-

alysts and programmers were reported in the Northern and Western parts of the country as opposed to those found in the Southern regions.

Data processing services were found to pay both professionals the highest wages, the report said.

The total labor force is predicted to grow at a slower rate until 1990, when the size of the labor force is expected

to range between 122 million and 128 million people — a 17% to 22% increase over 1980.

The late '80s will experience a slower growth rate than the early part of the decade because of the smaller amount of working-age people during that period, the report said.

The handbook is available for \$9 from BLS regional offices.

Diablo announced first 400 character daisy wheel printer. Because the world is

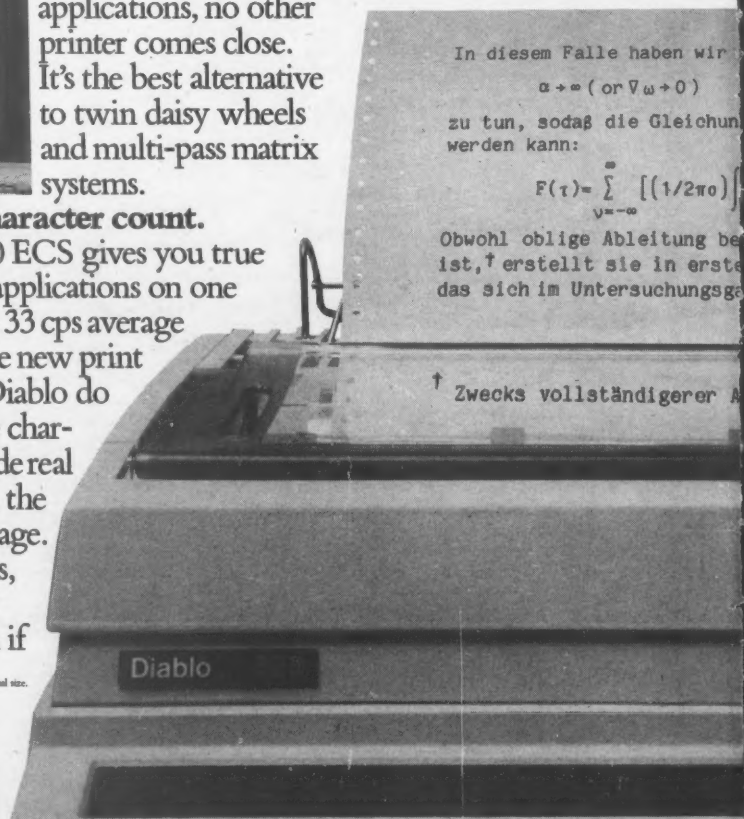
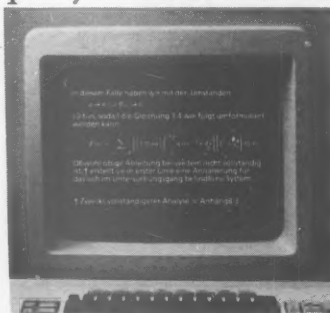
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Weg Decision Spurs Action

Auditors Mount Campaign for DP Abuse Laws

By Bob Johnson
CW New York Bureau
NEW YORK — Fed up with the lack of effective computer crime legislation, the Northeastern Regional Chapter of the EDP Auditor's Association has announced a campaign to get DPer and lawmakers moving on computer abuse laws.

According to the associa-

tion's regional vice-president, Ed Beddow, two recent occurrences lit the fire within his chapter. One was constant pleas from the association's Philadelphia chapter, which has voiced frustration over minimal success in getting lawmakers interested in computer crime; the second was the recent court decision which vindicated Theodore

Weg, a New York DPer accused of using his employer's system to trace racehorse genealogies [CW, May 3].

Beddow and Jim Fleming, the co-architect of the campaign who is chairman of the association's Government Liaison Committee, both expressed particular concern over the court decision and termed it a "shocking" exam-

ple of the lack of understanding of computer abuse.

"There is a tremendous misunderstanding of computers in general and how they are used in business. The Weg case was incredible! I can't see why the current theft laws didn't cover it," Fleming said.

The EDP auditors said that a dialogue concerning what

computer crime is and what can be done about it has got to be set up and that they will attempt to be the vanguard. They noted that their association includes members from every industry in the country and includes the top companies that could benefit the cause a great deal.

Seen as Resource

"We want to be considered a resource for individuals and groups concerned about computer crime legislation. Obviously, any effort will need legal assistance as well, but we feel we can offer a wealth of knowledge," Beddow said. Fleming added that EDP auditors have always been in a position to have to translate technical jargon into English and that is what is needed in computer crime legislation.

Beddow noted that his region alone has nearly 5,500 members, who make up about one third of the association's entire membership. He said that if his people are successful in bringing this matter to light, the entire organization might join in and offer a strong lobbying force.

The vice-president explained, however, that better control of the campaign can be exercised on a regional level initially.

As part of its plan, the chapter will wage a direct mail campaign to DPer and lawmakers alerting them to the issues at hand. Matters such as the outcome of the Weg case and a file full of computer abuse cases will be referred to as examples.

Fleming said that his committee will attempt to meet with lawmakers such as Rep. Bill Nelson (D-Fla.), who sponsored the Federal Computer Systems Protection Act, and the chairman of the House Judiciary Subcommittee on Civil and Constitutional Rights, Rep. Don Edwards (D-Calif.).

He hopes that the combination of action by the association's government liaison committee and the views and support of legislators will wake the legal system and prompt it to take steps about computer crime.

In addition to a national awareness effort, Fleming said that as an offshoot the association may look at state computer crime legislation as well. "We have to tell all of the people we can about our goals in order for it to work effectively," he said.

"A recent *Computerworld* article told of how Nelson's bill has been around Capitol Hill for almost five years. It's time for something to be done," Fleming stated.

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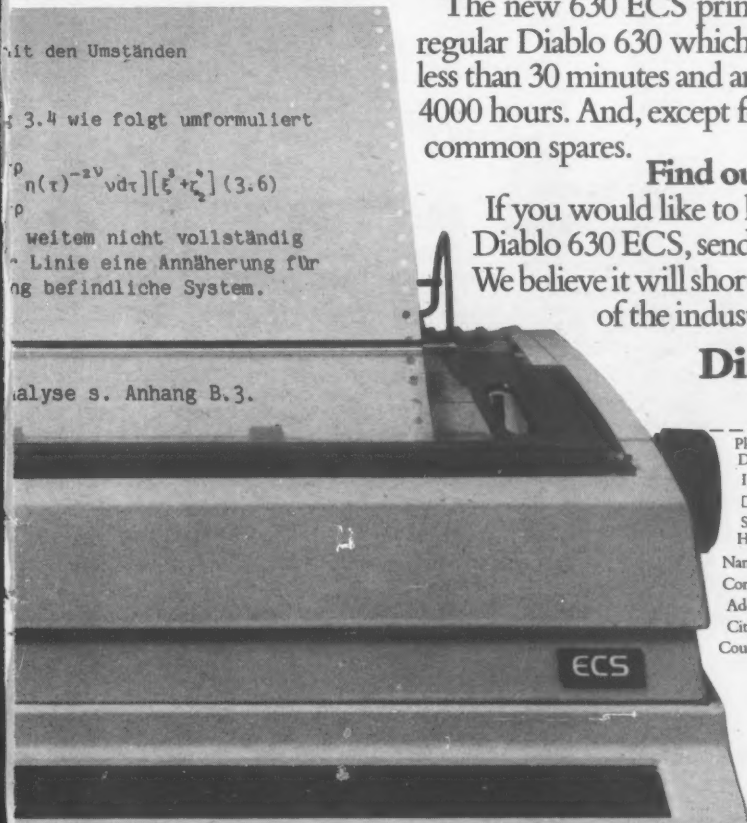
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Micro Success Launches Missionary Efforts

By Lois Paul

CW Staff

NEW YORK — After spending 10 years attempting to work through many of the problems end users face when dealing with data processing, William Clifford, vice-president and actuary for The Equitable Life Assurance Co., bought himself some computing power in the form of a micro-computer.

"The notion of having a computer facility that I could work with myself just blew my mind. I was very interested in it," he said, describing the purchase of his department's first Apple II microcomputer from Apple Computer, Inc.

Clifford said he basically fielded two kinds of problems with data processing over the years. "First is the programming issue and making your specifications clear to the programmer. Then, after you get through system development, there is getting

the production job done on time."

Stage Set For Micros

The stage was set for the introduction of micros into the financial management office at Equitable in 1980 when Clifford's group was contemplating a new financial reporting structure. "We had set ourselves the goal of having a process in place to have a relatively large number of divisions report separately each month what their earnings were," he explained.

While they were struggling with how to go about setting up this structure, Clifford said a consultant they were working with heard television personality Dick Cavett's advertisement for Apple microcomputers on

the radio. He suggested looking into this area, and a representative from Booz-Allen & Hamilton, Inc., which also was doing consulting work for Equitable, seconded the motion and advised them to check Visicorp's Visicalc spreadsheet package.

An employee was sent on a shopping trip and soon the first Apple II along with a copy of Visicorp's Visicalc software was purchased.

Clifford said the success of the Apples and Visicalc in his department prompted his group to launch missionary efforts to spread the word about this alternative to the standard DP route.

"I have a lot of friends and acquaintances here in the financial community in different jobs

throughout Equitable. The Visicalc package just does so well the large spreadsheet number-crunching kind of work that many of these guys spend their lives on. So I was pleased to try and let them in on a good thing I thought they could use," he said.

For the future, Clifford does not want to get involved with product testing and research involving microcomputers. Being in a sort of production job, he is interested in trying to find tools that he is fairly certain will work. Among the micro software packages his group has purchased are Wordstar from Micropro International Corp.; Desktop/Plan II from Personal Software, Inc.; and DSS/Finance from Ferox Microsystems, Inc.

Group Forms To Fight Nukes

NEW YORK — A group calling itself Computer Professionals United for Nuclear Disarmament (CPU) been established here to "bring together computer professionals dedicated to the responsible use of technology."

CPU's first announced project is to ensure a public presence by the computer community at the Rally for Nuclear Disarmament, which will be held June 12 at the United Nations. The group's future activities will include "research into peaceful, productive and human uses of technology as well as educational programs and publications."

CPU will draw its initial membership from New York/New Jersey computer professionals; it plans to expand to a national membership.

More information about the group is available from CPU, Apartment 1E, 259 W. 10th St., New York, N.Y. 10014.

Data Security Meet Slated for June 28

CHICAGO — International concerns for the safeguard of information stored in computers and transmitted across national borders will be the subject of the "Operation Safeguard" world computer privacy/security conference here June 28-30.

The event is being cosponsored by SKK, Inc. and Racal-Milgo, Inc. It is expected to draw more than 500 executives of multinational companies and U.S. and foreign government officials. The conference participants will have the opportunity to inform U.S. and foreign officials where they stand in regard to computer privacy laws.

Speakers will include U.S. Sen. Daniel K. Inouye (D-Hawaii); Martin King, DP audit manager of General Motors Corp.; and Geza Feketekuty, assistant U.S. trade ambassador.

The conference registration fee is \$495. More information is available from Operation Safeguard, P.O. Box 66578, AMF/O'Hare, Chicago, Ill. 60666.

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Frees Up Central DP Resources

Micros Erase Need for Paper at Insurance Firm

By Lois Paul
CW Staff

NEW YORK — The approximately 100 microcomputers in use at The Equitable Life Assurance Society of the U.S. here are replacing pencil-and-paper tasks and, to some extent, freeing central DP resources by removing some smaller applications from the program backlog.

"The first things we are going out after are the pencil-and-paper kinds of things. Over time, you may be replacing some things you would have thought were possible only through centralized data processing," said Jack Tyniec, assistant vice-president for the pensions systems department.

The firm did not have a specific policy or action plan to promote the use of microcomputers until about six months ago.

Support Group Formed

Since then, Equitable has assigned its Office Automation Support Group the responsibility for reviewing the requirements for purchases of microcomputers, explained Joan Rothman, technology manager in the firm's Corporate Technology Office. In addition, the company is establishing a Microcomputer Support Group.

Tyniec was associated with one of the early applications involving Apple Computer, Inc.'s Apple II micro-

computers at Equitable. According to Tyniec, this project began two years ago in the firm's corporate financial management office.

Some of the reports developed through this pilot effort have found their way all the way up to the board of directors on a regular basis, he explained.

These fairly elementary kinds of applications, most of which were developed via Visicorp's Visicalc spreadsheet package, caused a sort of snowball effect. The small, unconnected pockets of micro users spread the word.

"Gradually the enthusiasm grew in a lot of other areas because of the fa-

vorable experiences people had," Tyniec said.

Most of the microcomputers used at Equitable have been Apple II's or IBM Personal Computers, mainly because of software availability, Tyniec noted.

In the last six months, the firm has recognized the need to limit the proliferation of a variety of systems to facilitate future support of this equipment, according to Tyniec.

"I don't think there is an actual prohibition on buying whatever it is you particularly feel you need, but there is a recommendation that unless you have a particularly specific need for a piece of hardware or software that only comes on one machine, your best bet for general applications is probably an Apple II Plus," Tyniec said.

There are no hard and fast plans to hook up the personal computers at Equitable in a local network. However, Tyniec explained that a lot of people are beginning to think about the micros in this way.

"We have in fact ordered a half a dozen Apples for one of our regional marketing groups and one of their purposes is in fact to be able to communicate at a fairly elementary level with each other."

Users of the micros are end users, generally in either financial or administrative areas of the company. Some of their applications are departmental budget tracking, salary projections and future year budget projections — tasks that most people are still doing with pencil and paper, Tyniec said.

There has been a lot of attention to the micro phenomenon from the senior level, Tyniec said. "To the point that a couple of them have gotten microcomputers for use at home," he affirmed.

Healthy Attitude

Systems groups, such as the one Tyniec heads in the pensions department, are evidencing a fairly healthy attitude toward the encroachment of micros into their area. They are helping the users determine what their needs are and they are assisting with installation, training and consulting, to some extent.

As for the micros taking on some of the work of big machines, Tyniec said that this has not yet become a factor at Equitable.

"There may be a very modest displacement of time-sharing costs for those kinds of applications that are very straightforward," he said.

Otherwise, there is not yet any indication that micros will postpone the need for large system upgrades or in other ways displace mainframes.

What Rothman envisions is an increasing trend toward users doing more and more of their ad hoc systems, a heavier use of interactive systems and internal videotex and a move to information center-type environments and micros.

"I think micros will play a very strong role," Rothman said, noting that she expects they will serve as the personal workstation.

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FCC Inquiry Could Send Flat-Rate Private Lines To the Scrap Heap

By Phil Hirsch

CW Washington Bureau
WASHINGTON, D.C. — Flat-rate domestic private-line service, which has long provided many business telecommunications users with relatively inexpensive service, may be headed for the scrap heap as the result of an inquiry begun here late last month by the Federal Communications Commission (FCC).

The commission has asked interested parties to comment on four plans for allocating the nontraffic-sensitive costs of providing long-distance dial-up and private-line services. The former include Message Toll Service (MTS) as well as Wats.

These costs are now paid directly by AT&T's Long Lines Division and its competitors, such as MCI Telecommunications Corp. The carriers, in turn, add something to the monthly charges they impose on their customers. Under the four proposals unveiled by the commission late last month, in many cases, the user would pay a separate network access charge, for nontraffic-sensitive costs. The bill for service would go down in the process, but it is not clear that the total communications expense—service plus access—would be less. Under some of the alternatives proposed by the commission—those allocating nontraffic-sensitive costs mostly or entirely on the basis of usage—the customer with heavy communications traffic would also certainly pay more.

Immediate Cause of Inquiry

The immediate cause of the FCC inquiry is last January's AT&T/Justice Department agreement proposing an end to the government's marathon antitrust suit. That agreement bars use of the "settlement division of revenues process" under which the Long Lines Division now pays telephone operating companies for access to their local-exchange networks.

But the argument over access charges has been going on for a long time, chiefly between AT&T on one hand and larger corporate telecom users and "other common carriers" on the other. The basic complaint has been that Bell operating companies charge private users and other common carriers too much for access.

The most recent example of this battle is a confrontation at the FCC a few months ago over the access charge imposed on the other common carriers [CW, May 3]. They had been paying 55% of what the Long Lines Division had been paying, but for some that was allegedly nowhere near as good; among other things, this difference requires other common carrier customers to use many more digits than AT&T customers in setting up long-distance calls.

AT&T insisted on increasing the charge by increasing the minutes of usage assessed against each other common carrier. The other common carriers wanted the minutes of usage reduced. The commission did allow a temporary increase, but not as much

as was sought by AT&T, which then launched an investigation.

Access-Charging Plans

One of the four access-charging plans proposed by the commission last month (generally referred to as "Pure 1") would aggregate the nontraffic-sensitive costs attributable to MTS, Wats and private-line service and divide this total by the minutes of usage. Each subscriber would then pay according to his usage. Another proposal ("Pure 2") would use total nontraffic-sensitive costs by the number of lines; each customer's access charge would then vary according to the number of lines leased.

The other two proposals combine elements of the first two. "Mixed 1" would impose a flat-fee access charge on private-line users, but a usage-sensitive charge on MTS/Wats customers. "Mixed 2" would require multiline business service users, as well as private-line users, to pay a flat-rate per line; other subscribers would be charged on the basis of use, but could opt for a flat rate.

Comments on the proposal are due Aug. 6 and replies by Sept. 15.

Shortly after the FCC voted unanimously to launch the new inquiry, four of the commission's seven members endorsed the idea of billing the subscriber directly.

Delay Sought On Wats Decision

WASHINGTON, D.C. — Three telecommunications users groups have called on the Federal Communications Commission (FCC) to delay any decision on integration of Wats and long-distance toll service.

The main request to the FCC came from the Ad Hoc Telecommunications Users Committee, a group that includes United States Steel Corp., Ford Motor Co., General Motors Corp. and several other large companies. The committee was joined by Aeronautical Radio, Inc. and the Aerospace Industries Association.

The object of their concern is the FCC's Phase II investigation of Wats launched last April [CW, April 19], the second step in an investigation kicked off in December 1980 after MCI Telecommunications Corp.—charging Wats rates were discriminatory—took AT&T to court. A number of changes ensued, but the FCC still does not believe the current Wats tariff is nondiscriminating, as the commission put it last April.

"Wats and [Message Toll Service] MTS have been found to be like services. They have similar costs within the public-switched network and exhibit virtually identical calling patterns in terms of distance.

"However, the tariff structures as designed by AT&T are different in many important respects... Such completely different structures have created market segmentation, which is one prerequisite for price discrimination."

Justice Saying 'No' To BOC Expansion

By Phil Hirsch

CW Washington Bureau

WASHINGTON, D.C. — Allowing AT&T to offer on-line information services will bring to the market "additional resources, technology and potential for innovation," according to the Department of Justice.

This was one of several points the government stressed in its latest pronouncement on the AT&T antitrust case settlement.

About a month ago, Federal District Court Judge Harold Greene, who is presiding over the case, invited comments from interested parties on the settlement. About 600 parties re-

sponded, and the Justice Department, late this month, summarized and responded to their comments.

While Justice Department attorneys believed that allowing AT&T into the on-line information market would enhance competition, they took a different position regarding the Bell operating companies.

Although the settlement, as negotiated last January, limits the Bell operating companies to local-exchange and related monopoly services, the Justice Department's latest statement seems to modify that provision.

There is "no intention to preclude provision of services by the Bell operating companies that may not be provided on a competitive basis," the statement said.

If such competitive offerings do not appear likely "as the date of divestiture approaches," the Justice Department will request a waiver of this provision from the court in cooperation with the Bell operating companies, according to the report.

Implementation a Key

Also, the department contended that services involving the storage of information would not, by themselves, be prohibited to the Bell operating companies under the decree.

This suggests that the divested operating companies would be allowed to offer electronic mail, data processing and other data base-related on-line services.

The department stressed in its statement that even after the settlement is accepted by Judge Greene, he — as well as others — will be able to comment on its implementation.

This argument was directed at those who have criticized a provision of the settlement that leaves the Department of Justice exclusively in charge of monitoring AT&T's implementation of the settlement, once Judge Greene has accepted it.

The department added that it will welcome input from all other interested parties.

AT&T Filing

However, AT&T, in a separate, related filing to Judge Greene, pointed out that such comments could not change the court-approved settlement.

And at a meeting of the Federal Bar Association in Washington, D.C. recently AT&T Attorney Jim G. Kilpatrick contended that Judge Greene also would have no power to alter the settlement once he approves the consent decree negotiated last January [CW, May 31].

Possibly because of this, Judge Greene last week issued 12 pages of questions on which he wants additional comments from those who filed earlier.

The earlier comments, while helpful, aren't adequate without further elaboration, he said.

The new comments are due June 14th, and a hearing has been scheduled for the week of June 28th.

Analysis

spended, and the Justice Department, late this month, summarized and responded to their comments.

While Justice Department attorneys believed that allowing AT&T into the on-line information market would enhance competition, they took a different position regarding the Bell operating companies.

Allowing the divested operating companies to offer enhanced services would give them "the means and incentive to disadvantage their competitors by cross-subsidization and discrimination in the terms and conditions of access to the local exchange," the department said.

And allowing the Bell operating companies to offer "sophisticated" terminal equipment would give them "substantial opportunities to discriminate between their own offerings and those of their competitors."

These comments reflect a major reason for computer industry opposition to the proposed settlement.

User Points Covered

Vendors of computer-based on-line services and systems suspect that letting AT&T market such products will give it "the means and incentive" to disadvantage competitors by "cross subsidization and discrimination" rather than "bringing to the market additional resources, technology and potential for innovation."

The Justice Department summary covered a number of other points raised specifically by data communications users and vendors in their comments on the proposed settlement:

- The department "doesn't believe it necessary or appropriate for the [settlement] to address the interconnection of Bell operating companies with private systems." The reason is that the needs of the two groups are different and, besides, "establishment of unbundled exchange access tariffs, pursuant to the [settlement] should facilitate the ability of private systems to obtain access to such Bell operating companies facilities and services as the regulatory authorities deem appropriate."

- Transferring terminal equipment from the Bell operating companies to AT&T will not encourage "migration

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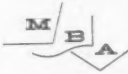
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DBMS Market Predicted To Determine Standard

By Lois Paul
CW Staff

WAKEFIELD, Mass. — Market demand rather than edict eventually will make the relational model a standard for data base management systems (DBMS) and application development languages, but this will be a concept rather than a programming standard.

This is the prediction from Dr. George Schussel, president of Digital Consulting Associates, Inc. in Lynnfield, Mass.

Interviewed here recently, Schussel said that at the physical implementation level, packages will retain their distinctions. However, at the concept and logical model level, the standard he foresees will be the relational data base model.

Modified Terminology

Schussel noted that the terminology of the relational model will have to be modified. For example, "tuples" would be called "rows" and "domains" would be known as "columns."

"The Codasyl standard is almost a moot issue, as it is clear that it will not be adopted and will not become a standard," he added.

"I expect by the mid-'80s that the vast majority of data base models will be able to support third normal form relational models as input," he said. "It will become a language of communication," he added, explaining that people will talk about user views and design them along the lines of third normal form.

Key Trends

Schussel outlined some other key trends of the '80s that he discussed as seminar leader for The National Data Base Management System Symposium that recently was held in Chicago.

The reduction of hardware prices will continue to be a reality, he said. In addition, networking and communications will grow in importance, particularly as people make the move to smaller machines and want to interface their applications to other small systems and to larger systems.

In terms of systems software, Schussel's feeling is that users will understand and accept the necessity of buying a whole set of products such as DBMS, development aids, teleprocessing monitors and program generators, which will be purchased together almost as if they were purchasing an operating system. Although applications software packages will experience tremendous growth during the '80s, they will not fill the majority of people's needs and DBMS and data dictionary/directory products still will be required.

In terms of firmware in the future, Schussel's belief is that backend computers may be an important part of the market. "The relational data base model unquestionably would work best on a machine that could support associative memory accessing," he said, adding that if that capability could be put in a box and sold, it could be the answer to performance questions for the relational model.



Dr. George Schussel

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U.S. Users Asked About Software Development

PRINCETON, N.J. — A survey of North American DP users about methods for software development, quality assurance and project management is being conducted by Pactel, Inc. here on behalf of the UK government.

The 14-page questionnaire that Pactel is distributing to North American users is also being sent to users in other parts of the world by other subsidiaries of PA Computers and Telecommunications, Ltd., a consulting company headquartered in London.

Responses are due by the end of May, according to Stephen G. Payne, a Pactel principal.

The survey concentrates on development of applications software, Pactel consultant H. Colin Mitchell added, and is aimed at a broad range of user organizations. PA Computers and Telecommunications expects to complete tabulation of results from users around the world by July, Mitchell noted.

Payne said anonymity is guaranteed for any respondent to the survey, which consists of eight sections that ask fill-in or multiple-choice questions plus a page for written comment. Three pages of the questionnaire define terms — for example, the six formal methodologies for systems development named in the document.

The survey asks the respondent to describe his principal internally developed software system, what techniques and tools were used to develop it, the average expertise-level of personnel who worked on the project and the environment in which the software system operates.

The survey is being conducted for a UK government agency, Payne said. Findings of the survey will form the basis of recommendations from that agency to other agencies of the UK government on how to approach software development projects, Mitchell indicated.

For further information on the worldwide survey, contact Mitchell or Bob Poston at Pactel, 707 Alexander Road, Princeton, N.J. 08540.



Void Between DPer, Laymen

Programmers Said Unable to Meet Users' Needs

By Brad Schultz

CW New York Bureau

NEW YORK — Senior programmers may no longer be qualified to write software appropriate for a growing portion of the user community, a noted expert on the ergonomic aspects of computing charged here last week.

Tips on how the interface

between systems and humans can benefit user organizations were also given by University of Maryland's Prof. Ben Schneiderman, author of *Software Psychology: Human Factors in Computer and Information Systems*.

Schneiderman has long studied how interactive systems affect user productivity and morale. Speaking at a

symposium on user interfaces held by New York University's Graduate School of Business Administration last week, he named three reasons why the DP community is deeply concerned about the human factors aspect of computing.

The first reason for this deep concern, Schneiderman maintained, is "the expansion

of the user population to include novice and non-technically trained people."

In the first decades of computer software development, senior programmers designed software for themselves and their peers, the professor pointed out. But the user population for office automation, personal computing and point-of-sale terminals is "so vastly different that the experience and intuition of senior programmers may be inappropriate," he commented.

Insensitive to Needs

In other words, veteran programmers may generally be insensitive to the needs and constraints of the growing numbers of lay people in the user population who, nevertheless, consume software that can only be produced by veteran programmers, Schneiderman indicated.

"The egocentric style of the past," he told the symposium, "must yield to humility and a genuine desire to accommodate to the users' skills, wishes and orientation. Designers must seek more direct interaction with the users during the design phase, development process and throughout the system life cycle."

A second reason why the DP community is deeply concerned about human factors in computing is the in-

creasing organizational dependence on interactive systems, Schneiderman declared. Computer software was once promoted as a "cost-beneficial improvement" to an organizational department, which did not radically change in relation to other departments as a result of implementation.

But in recent years, many organizations were restructured to fit interactive systems. These systems are now central to such organizations as hotels, airlines, automobile rental companies and financial institutions, he noted, adding that decision support systems in many companies are based on interactive computer systems.

A third reason for deep concern about human factors in DP is the high performance requirements of "life-critical applications" — including medical intensive care, nuclear reactors, air traffic control, utility control and police dispatch applications, as well as military command and control.

According to Schneiderman, "IBM and AT&T have several hundred professionals working on human factors issues and a major commitment to expansion." Other vendors are following suit, he asserted, adding that "the academic community and professional societies are struggling to respond to the rapid growth of interest."

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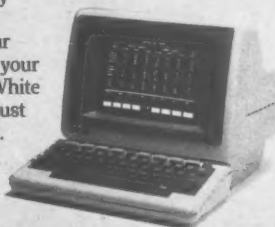
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Tips Offered on Boosting Productivity, User Morale

By Brad Schultz

CW New York Bureau

NEW YORK — University of Maryland computer scientist Ben Schneiderman gave the following tips on what — from a human factors perspective — users should demand in the systems they purchase in order to boost productivity and user morale.

Regarding command language vs. menu selection, he said:

- Users should be able to enter their choice before the menu is completely displayed and shortcuts should be permitted for knowledgeable users.

- Knowledgeable and frequent users prefer command languages, but novice and infrequent users may have trouble remembering permissible syntax, what various sequences of commands can achieve and what certain error messages mean.

Regarding response time and display rates, Schneiderman noted:

- Typing and cursor motion commands should generate results in 0.1 seconds.

- Frequent simple commands should take less than a second.

- Other commands may take longer, but similar commands should take roughly the same time to execute.

"This gives users the sense of predictability, helps sensitize them to anomalous conditions and permits planning a sequence of commands. Users will modify, if possible, their command sequences to avoid slow operations."

Regarding the wording of error messages, Schneiderman advised that morale and productivity will improve if end users receive error messages that do not imply they have done something stupid or catastrophic; that, in some cases, suggest that the system has failed to meet the end user's expectations, rather than vice versa; and that point concisely and clearly to a procedure for resolving the problem.

User-Oriented Designs Needed

Ergonomics Takes Many Types of Experts: IBMer

By Brad Schultz

CW New York Bureau
NEW YORK — Computer manufacturers and systems developers need several kinds of experts in the study of ergonomics, an IBM scientist told a New York University (NYU) symposium here recently.

On the basis of human factors analysis, computer sys-

tems should be designed to fit what users really are rather than what designers believe users should be, Dr. John C. Thomas told the symposium on user interfaces held by NYU's Graduate School of Business Administration.

Thomas researches human factors on the staff of IBM's Chief Scientist at IBM corporate head-

quarters in Armonk, N.Y.

Systems should not, for example, be designed on the assumption that users will read pertinent reference manuals cover to cover before using them, Thomas declared. IBM researchers have concluded that users tend to skip around when they read system reference manuals and tend to try out functions

before reading about them, the scientist explained. Hence, developers should not place a major reading burden on users; they should place a burden on themselves to turn out systems that impose light reading burdens, he indicated.

In terms of temperament and background, different kinds of human factors ex-

perts should work on the initial design, production and testing stages of systems development, as well as review user experiences with finished systems.

Understand Humans

Human factors experts involved in the design stage of systems development require "a deep understanding of human behavior in general and familiarity with the intended user set in particular," he maintained. "This person should be assertive and capable of expressing their ideas to other members of an interdisciplinary team."

Human factors experts involved in the production stage of systems development must be "willing and able to make numerous judgments about the developing product on the basis of far less information than one would want in a scientific experiment," Thomas said.

In contrast, scientific experimentation is similar to the work of human factors experts in the testing stage of systems development, he suggested. However, a physical sciences background is "insufficient for an appreciation of the effects of experimenter bias and how to avoid them." The systems testing stage demands experience in methodologies for testing human subjects, he explained.

Finally, the expertise necessary for human factors analysis of user experiences with a system may be found in a behavioral scientist familiar with survey and interview techniques, Thomas continued. The human factors expert involved in this stage of systems development should "give honest feedback to the entire development team on what users actually do with the product and what they value, find difficult, find easy and find of no use."

Thomas said that IBM's development of the System/38 paired one behavioral scientist with one "computer scientist implementer who had responsibility and authority for the interface." A group of behavioral scientists was on tap during System/38 development, he pointed out. In addition, a behavioral scientist took charge of System/38 user surveys.

As for IBM's recently announced Audio Distribution System (ADS), Thomas stated that six different behavioral scientists worked on various stages of its development. Prior to the formal introduction of ADS, "an independent group of human factors experts" tested the system on "representative users."

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Government Has 'Important Role' To Play in Information Revolution

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Although the Reagan administration is emphasizing deregulation and reliance on the private sector, the federal government still has an important role to play in the information revolution, the Commerce Department was told last week.

At a two-day conference held by the department's National Telecommunications and Information Administration, representatives of industry and academia said the ever-quicken pace of technology development makes some central, stabilizing influence essential to the orderly and equitable societal absorption of DP/telecommunications products and services.

Government must "stay off the backs" of industry, but it should act as a sort of referee in the spread of high technology, Jane Bortnick of the Library of Congress suggested. The U.S. needs consistent federal policies as a "baseline" for industry-government cooperation, she said.

Areas for Government Activity

Bortnick and other speakers at the meeting here on "Future Directions in Information Policy" identified several areas appropriate for government activity, including:

- Support or initiation of standards, guidelines and protocols to spur rapid adoption of new technology and remove costly and delaying battles over competing forms of new products and services.
- Support of research and development of information technologies — if not through actual financial assistance, then by removing barriers to joint industry R&D — and encouragement of long-range planning.
- Protection of individual rights in the application of new technologies.
- Support of scientific education, particularly to advance more widely what is commonly referred to as "computer literacy."
- Support of U.S. information firms' efforts to develop and service international markets.
- Protection of proprietary rights related to high technology.

On the subject of government involvement in standards development, Dr. George White, Xerox Corp. vice-president for research, engi-

neering and development, called private-sector standards disputes "pure waste." In the dispute over any standard, "the central issue is to get it written, not to get it right, to get it codified and get it out."

Standards can be changed later if necessary, White explained, but the country cannot afford to delay implementing new technology developments.

Long-Range Planning

On long-range planning, Dr. Alan Kay, Atari, Inc. chief scientist, said meeting Japanese competition in the information industry depends on taking a long-range view towards R&D. If you plan for 10 years, it is easier to know where you will be in two or three, he said.

Moreover, "you can afford to botch a few things in the short term" if you have a well-developed plan for the long term, according to Kay, who added that this kind of approach undoubtedly will produce some beneficial developments serendipitously.

As far as protecting individual rights in a high-technology era, Kay said, "The privacy issue is almost certainly something that has to be decided by some sort of government mandate." There was no substantial disagreement on that point, as on the question of government support of computer education.

This educational effort, according to Kay, will be spurred by Japanese competition. The Atari executive said, "I'm personally absolutely thankful the Japanese are there." The challenge of that nation's information industries will force the U.S. "to move off its duff," he said.

One Step Further

Dr. Carl Hammer, recently retired chief scientist at Sperry Univac, took the education issue one step further, saying it is not enough to promote American computer literacy. Because the U.S. has much to learn from other countries in many areas of high-technology application, this country needs to promote greater language skills to support technology transfer from abroad.

Conference participants also generally agreed the U.S. government must be more diligent in promoting open markets abroad. One part of this need has already been accomplished by the government's decision to end its litigation against IBM and AT&T, several remarked.

"The world's two best institutions are those two companies," White remarked, praising the government's decision to "welcome back" the two firms into the good graces of the government. The other nations of the world see those two firms as their greatest adversaries in the information revolution, he said, saying it was "idiocy" for the U.S. to act the same way toward them.

"The genie is out of the bottle," economics professor Dr. Manley Irwin, University of New Hampshire, said of the move to free AT&T in domestic and international markets. The U.S. should recognize and appreciate the creativity of that firm "rather than try to put the cork back in the bottle," he said.

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Logic Users Slated To Meet June 13-15

DALLAS — Logic, Inc. will hold its Second Annual User's Conference on June 13-15 at the Amfac Hotel at DFW Airport in Texas.

The conference reportedly will focus on innovations occurring in the credit insurance industry and solutions to its problems.

Among the speakers will be John S. Mailho, director general of Lucien Compagnie d'Assurance of the West Indies; and Hugh Rosenbaum, vice-president of Risk Planning Group in Darien, Conn.

The registration fee is \$100 until June 1 and \$150 thereafter. More information is available from Logic at 1100 Stemmons Tower S., 2720 Stemmons Freeway, Dallas, Texas 75207-2277.

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Service Bureau Simplifies Remote Data Transmission, Saves Postage, Disk Space

ANAHEIM, Calif. — When you operate a service bureau that serves more than 200 customers, one thing you need is a simple way of transmitting data to remote installations in various sites across the country.

Global Data is a service bureau here that is involved in research and development for Digital Equipment Corp. PDP-11/70 minicomputers and Radio Shack TRS-80 Model 2 microcomputers. In addition, it handles the diversified needs of more than 200 customers.

Jim Murray, the firm's manager of

technical support, explained that he was looking for something to help simplify the transmission of data to Global's remote installations in San Jose, Calif. and Chicago, as well as to its customers.

Solution to the Problem

Murray's solution to the problem was SMM/Tracs, a software package from Software Module Marketing, Inc. that supports bisynchronous batch data processing computers and devices and is available for both OS and DOS sites. "I haven't run across anything yet that I can't communicate with using SMM/Tracs — as long as the piece of equipment can talk bisynch," he said.

Most of Global Data's programming staff resides in Anaheim where the development work on the company's big packages is completed, Murray explained. When modifications are made, they use SMM/Tracs to update their libraries at their other sites.

Prior to SMM/Tracs, the procedure was to put the data on tape and send it to remote locations via air freight or express mail, he said. This method of data transmission not only took several days, but also was more costly. Using SMM/Tracs, the firm transmits data on a daily basis by using a 2400 bit/sec lease line to San Jose and dial-up support to Chicago.

Savings in Disk Space

In addition to the savings in postage, Global Data has realized a savings in disk space at its remote sites, according to Murray. "After we have tested object code here in Anaheim, we send the executable code right to the core libraries of our other sites via SMM/Tracs, which eliminates the need to maintain a lot of source at the other sites on disk."

He said that many of Global Data's customers are using the TRS-80 in their small shops and sometimes they need to generate a large report that their microcomputers cannot handle. With SMM/Tracs, they dial into Global Data, download their file to Global's IBM mainframe and then Global generates the reports.

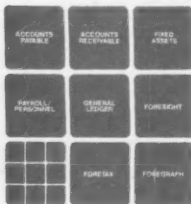
The service bureau also has used SMM/Tracs to communicate between DEC and IBM, Murray continued, noting that many of their on-line customers have DEC PDP-11/70 minicomputers. Sometimes these customers want to run big batch jobs that overload their DEC systems. "Using SMM/Tracs, we download their DEC files to our IBM and process their reports so they don't impact the on-line system so much," he explained.

Another use Global Data has found for the software involves taking information from their Entrex, Inc. keypunch machines and transmitting the information directly to the IBM mainframe, which starts executing immediately. Murray said, "The keypunched information had to be put down on tape, hand carried to the computer room and checked into control, where it waited until an operator decided when to run it."



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Bill Pending on New Network Antiquated System Limits Leaps for Mass. Police

By Marguerite Zientara
CW Staff

BOSTON — When Metropolitan District Commission police officer James D. Mills pulled over a 1966 Mustang with a "For Sale" sign on it, he had a "gut feeling" that the driver was guilty of more than a minor traffic violation.

A quick radio check to the Criminal History Systems Board's Law Enforcement Agency Processing System (Leaps) computer here, however, revealed nothing except that "The system is down."

Since the driver was "licensed, legitimately registered, et cetera, et cetera," Mills said, "I had no legitimate reason to take the motor vehicle from the individual."

Mills let the driver go and later checked the computer upon its recovery to find that the car in question had been stolen in Texas and that the man was wanted by the Massachusetts State Police for a traffic violation. It took eight more hours of work for Mills to relocate the man and the stolen car.

While Leaps administrators claim a current 98% uptime for its Burroughs Corp. B6700 computer, Mills noted, "The computer is down a lot more than we'd be happy with." The real problem, according to the board, is not in the computer but in what is connected to it.

Accessing the B6700 are 253 Teletype Corp. ASR-28 machines around the state that are "over 60 years old," operating on 75 bit/sec lines, board executive director Louis Sakin said. Only 30 in-house Burroughs MT-983 CRT terminals are connected to the system, even though the system was designed for CRT terminals operating on 4,800 bit/sec lines, he explained.

"You have six to eight terminals per line," explained applications programming manager Tom Lemaire, "which means that only one terminal can use the line at any time."

"If one person is receiving a message, everyone else has to wait until that terminal is done, which means if you're fourth or fifth in line, you can indeed wait quite a long time — 20 to 30 minutes," a situation Lemaire called "horrendous."

An officer on the street can run into problems with such a wait, since the average allowable car stop without a charge is 20 minutes, according to Mills.

To combat such problems, officials have proposed in-

stalling a network of 4,800 bit/sec lines connecting all cities and towns to be operated by AT&T. With this system, response time would be cut to seconds, Sakin said.

Massachusetts Gov. Edward J. King asked for \$956,702 in his fiscal 1983 budget to cover the cost of the lines, while each municipality would have to pay for a CRT termi-

nal and maintenance. Last month, however, the House Ways and Means Committee gave the project an unfavorable report. The Senate is now considering the proposal and "we're optimistic they'll vote it in," Sakin said. If the project isn't funded, each municipality will have to pay for line and terminal costs, a jump from about

\$2,400 to \$6,000 — and one which many budgets reportedly could not meet because of Proposition 2½.

While Leaps' reliability problems stem largely from its antiquated components, it is noteworthy that the 98% uptime figure applies only to the period since April 22, according to Sakin. "We installed a backup B6700 on

April 1 and we have seen a rather significant increase in total system availability."

From Jan. 26, 1981 through April 22, 1982, however, the system registered a 94.7% uptime rate, according to Sakin. The lower rate stemmed from "downtime associated with the installation" of the initial B6700 hardware and software, he explained.



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Bank Saves Time With System Tracking Higher Education Loans

BOSTON — The Mutual Bank for Savings here is processing more Higher Education Loan Program (Help) loans with the addition of a student loan tracking system.

Developed by Cortex Corp. and the bank, and using the vendor's Inform application development language, the system identifies eligible students, updates files and gen-

erates audit trails.

Prior to 1981, the number of loans granted was largely determined by the number of people available to track the loans, update files, fill out forms and write correspondence. Today, the system efficiently automates the notification and follow-up of accounts, freeing staff to do more repayment counseling,

a Cortex spokesman said.

Inform is a fourth-generation, user-friendly language that reportedly shortens the software coding and testing cycle up to 80% compared to conventional programming. The language is said to provide this large increase in application productivity through rapid prototyping, quicker maintenance, non-procedural programming and simple user-friendly utilities.

Between the first application step initiated by the student and the final collection of the loan is the generation of a series of letters and forms, all handled automatically by the Cortex tracking system.

After the bank receives the student's application for the Help loan, an operator keys the information into the system. Next, the system generates a letter to the admitting school for verification of enrollment and then compares the school's information with the student's. If the information fails to match, the system notifies the student of the problem.

Once the problem is resolved, the system directs the application to the Massachusetts Higher Education Assistance Corp., a private non-profit corporation, for approval. If there is a conflict of information during the entire approval process, an appropriate letter is generated and sent to the proper source to resolve the conflict; an acceptance or rejection letter follows.

The loan-granting procedure can require as little as three or four weeks or up to two months during the peak application months between April and September. The waiting time is determined by factors without, not within, the bank.

During the college years, up-to-date accounts are kept easily and accurately, requiring little manpower and freeing staff for counseling clients. "It's an easy way to control information," Paula Nastasia, assistant vice-president of Mutual Bank, said. "It is definitely not easy to access a system that is all on paper. But now all we have to do is make a query to find out what we want to know."

Prior to maturity, Mutual Bank again contacts the student to give him a personally calculated repayment plan, giving several payment options. When the bank learns of the selected option, a promissory note is sent to the student to sign, and repayment begins the following month.

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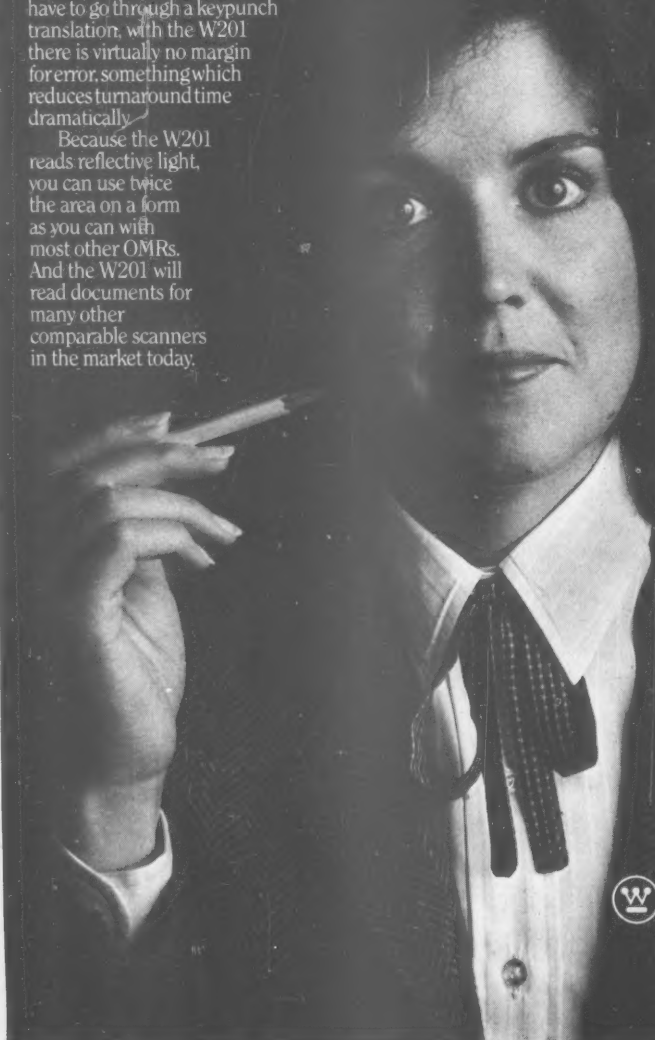
That's because the Westinghouse W201 reads the marks of an ordinary pencil. It can even tell the difference between intentional marks and flaws in the paper. And it can do so at a rate of 170 sheets per minute. Because the information doesn't have to go through a keypunch translation, with the W201 there is virtually no margin for error, something which reduces turnaround time dramatically.

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Film Eases Stress — And That's No Fish Story

LOS ANGELES — Got any stress problems? Go fish!

That is the advice of Candle Corp., a software firm based here that has developed and is selling a 57-minute videotape of tropical fish swimming around in an aquarium. The color videotape reportedly reduces office stress by creating a calming environment.

Candle became interested in this concept after learning about experiments at the University of Pennsylvania with fish and their relaxing effect on people. Video Fish One, being marketed by Candle's Information Services Division, represents the application of the concept to an office setting.

The videotape — which features gurgling sounds in the background that are supposed to lower the viewer's blood pressure — follows a nameless variety of piscatory species about a tank, zooming in on one every few minutes. A slow stream of bubbles curves up the center of the picture throughout most of the program. A Candle spokesman says the firm has been swamped with calls from dentists, hospitals and hotels interested in the new "environmental software" product.

Wade Evans, Candle's video production specialist, believes that the video presentation is more effective in soothing people's nerves than just watching an actual tank of fish. "Seeing them close up and allowing the two cameras to dissolve back and forth to different angles, you get more intimacy with

the fish ... It was a very peaceful experience."

The University of Pennsylvania's research came out of its Center for the Interaction of Animals and Society. Dr. Lawrence Glickman, chairman of the research investigations, reported its findings in his study entitled "Talking, Looking and Blood Pressure: Physiological Conse-

quences of Interaction with the Living Environment."

According to Glickman, "when subjects were placed in front of the fish tank with instructions to do nothing but watch the fish, both systolic and diastolic blood pressure fell ... The blood pressure reductions observed when people watched tropical fish are similar to those

reported with the more cumbersome procedures of biofeedback and meditation."

Candle public relations director Rowena Andrews said the company has had more than 100 inquiries since the videotape was announced. "I thought it would take off," Andrews admitted, "but I had no idea we'd have to restock already."

Candle is now experimenting with other environmental videotapes including cloud scenes, fireplaces and rolling waves.

"Video Fish One" is available for \$35 for VHS and Beta versions and \$50 for the ¾-in. tape version. Candle is located at Suite 2404, 10880 Wilshire Blvd., Los Angeles, Calif. 90024.

CSF Method Course Topic

NATICK, Mass. — A seminar sponsored here by Index Systems, Inc. — a consulting and systems development firm — will examine the Critical Success Factor (CSF) technique and its use in business, June 10-11 at the Natick Hilton.

Keynote speaker will be Dr. John Rockart, creator of the CSF technique and director of the Center for Information Systems Management at MIT's Sloan School.

The seminar will focus on assessing the performance of CSF. The technique is used by corporate business structures attempting to create information systems to support business objectives.

Registration fee for the seminar is \$600 and should be sent to Index Systems, 5 Cambridge Center, Cambridge, Mass. 02142.

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Food Contracting Service Cooks With Collection of Computers

SEATTLE — Serving meals becomes a little less routine when hungry customers are located on oil drilling platforms somewhere in the Gulf of Mexico or in the wind-swept North Sea.

But Universal Services, Inc. International (USII), a 36-year-old food and maintenance contracting company based here, has a collection of Honeywell, Inc. computers that help the firm keep track of where its approximately one million meals per year are going.

USII is more than just an expanded fast-food operation. It is a complete restaurant operation that can deliver food, personnel and all the utensils necessary to serve hungry work crews anywhere on the globe.

Empty Mess Hall

The customer supplies only an empty mess hall that the firm reportedly transforms into a fully operational dining and kitchen area.

The food service company started using computers about seven years ago when it installed a Honeywell, Inc. Series 2000 mainframe.

Two years later the firm added a Honeywell Level 62 system and earlier this year it took delivery of four Honeywell DPS 6 small computers that will be used to distribute USII's DP operations among its field locations and businesses, according to Bob Pederson, the company's director of data processing.

The DPS 6 systems — a Model 74 and several Model 38s — are operating at the firm's Seattle headquarters and at regional sites in Anchorage, Alaska, New Orleans and Scotland. The Model 6/74 will initially handle the DP needs of two USII subsidiaries, Van de Kamp's Bakeries and Hilton Seafoods, Pederson noted. These needs include payroll, billing and inventory.

Upgrade Plans

Later this year, the firm plans to upgrade the 6/74 to a 32-bit Honeywell DPS 6/92 computer. Once the upgrade is completed, the firm's batch-oriented Level 62 machine will be removed and all existing files will be merged on the new computer, Pederson said.

The DPS 6/74 computer currently has 1M byte of main memory, 134M bytes of disk storage, 12 CRT terminals, a 600 line/min printer and three 120 char./sec printers plus a letter-quality printer for word processing output.

When upgraded to a 6/92, the system will have 2M

bytes of main memory, 335M bytes of disk storage and three additional CRT terminals. In addition, each satellite 6/38 computer will have 512K bytes of memory, 80M bytes of disk storage, two CRT terminals and one printer, Pederson noted.

The company's systems in Anchorage and New Orleans

will communicate with the 6/92 via 9,600 bit/sec dial-up communications links, while the system in Scotland will telecommunicate with the host computer via satellite.

While the computers will be used for USII's subsidiaries, their primary purpose is to keep a reign on the firm's food service business.

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Tape Duplication Advised

Report Says Most Damaged DP Firms Go Broke

By Marcia Blumenthal

CW Staff

SHORT HILLS, N.J. Fewer than 7% of all companies that experience severe damage to their DP operations are in business five years after the loss, according to a widely circulated insurance industry report.

"You would be surprised how few DP people conceive of what will happen [to a company] if the operation goes down," asserted Thomas R. Cornwall, manager of the Electronics Insurance Department of Chubb and Son, Inc., during a recent interview.

Users know the value of their hardware, but most have no idea of the total value of their media. Although most banks, insurance companies and other firms whose business depends on real-time information have duplicate tapes, many other companies do not see the value of duplication, Cornwall explained. In general, these firms have hardware systems valued at \$100,000 or less.

However, the revenues of those same firms can be in the \$5 million to \$10 million range, but often can include companies with revenues up to \$50 million, he added.

Recent Claim

In a recent claim handled by the insurance company, a user had a \$19,000 minicomputer and one million dollars in outstanding receivables destroyed. "We can sell you a million of receivables insurance, but isn't it a lot cheaper to buy a few extra tapes?" Cornwall said.

While it may appear paradoxical that insurance companies are not out to load up DP operations with enormous amounts of coverage, Chubb would rather reduce the cost of premiums for computer operations by making suggestions for protection against damage, according to Cornwall.

This is also true for other insurance companies offering extensive electronics coverage such as Fireman's Fund Insurance Companies and St. Paul Fire and Marine Insurance Co., he observed.

As part of its premium assessment procedure, insurance companies send engineers to DP sites to evaluate risk exposure. Some of the more commonly observed risk potentials are installing carpeting with flammable backing, locating the computer room in an easily accessible location and having a paper bursting operation in a combustible area, Cornwall noted.

Fire is the single most seri-

ous cause of loss, usually resulting from wiring insulation shorting out. Security is a second major exposure. Recently, Cornwall's firm had a claim from a company with very poor security, which had a \$125,000 loss because a "crazy" with a small caliber gun shot up the computer room.

Because of the difficulty of

recreating the information in a DP operation, Cornwall stressed that DP managers understand that it is preferable for the company to buy the basic insurance coverage and concentrate more resources on emergency and disaster recovery planning. But DP managers are not the sole offenders of overlooking the value of information

to an organization. People with fiscal responsibility in the firm have to be educated to understand the value of a DP operation to the company.

People responsible for buying insurance for the DP installation often do not take enough time to understand the coverage, Cornwall charged. For example, many

people do not understand that general liability insurance does not cover damage to the computer equipment but rather just covers the premises in which the equipment is stored, he said.

The attitude many companies hold, he said, is "we have insurance" so why bother inconveniencing employees.

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3 Staff Project: Wait one (1) turn.

4 CICS experts leave. Send people to school. Go back to start.

5 New Objective: CICS applications without CICS experts.

6 Call IBM. Wait two (2) days.

7 Investigate DMS/VS. Looks good. Go ahead three (3).

8 Ask Aunt Minnie for help. Go ahead one (1).

9 Investigate UFO. Call 800-631-1615.

10 Try DMS/VS. Not so good. Needs CICS experts. Go back two (2).

11 New objective: Executive query and Reports on-line.

12 Friend recommends DMS/VS. Go back five (5).

13 Try command level. Go back to start.

14 New Objective: New applications up without bringing CICS down.

15 Friend recommends UFO. Call OXFORD.

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Why So Few MIS College Programs?

Q Since you are a professor (computer science, no doubt), perhaps you could distinguish between a college curriculum in management information systems (MIS) and one in computer science. Why are there so few MIS programs and so many computer science ones?

A Your question is substantive and has caused considerable confusion and discontent among employers, students and university administrators and faculty.

The curricula are similar in that they both use the computer as a tool and deal with system design and programming. However, no two com-

puter science or MIS programs offer the same course. The fundamental difference is that computer science is concerned with applications-independent (generalized) software and MIS (or computer information systems, data processing) is concerned with specific applications. Computer science programs tend to concentrate on the hardware/software entity where MIS programs encourage a technical/business mix. For example, the computer science graduate might design and develop the software for a relational data base management system. An MIS graduate would use this software and design a corporate data base to support a variety of applications.

You should be aware that MIS and

computer science are only two of a variety of possible computer-related disciplines. Others include computer engineering, software engineering and computer-aided manufacturing and design. Several of these have not yet matured to a full-fledged four-year curriculum.

The job prospects for each of these disciplines are excellent and will remain so for at least another decade. Ironically, the majority of those graduating in computer science are pursuing careers more closely allied with MIS (applications programmers and systems analysts vs. systems programmers).

Even with the demand for applications-oriented programmers and analysts the way it is, there is a paucity

Turnaround Time

By Larry E. Long

of MIS programs. The problem is founded in a lack of understanding on the part of college/university administrators. Sadly, most do not know the difference between a computer and a disk pack.

Some computer science programs have tried to integrate MIS-type courses into the curriculum. Since most computer science professors have only a lukewarm interest in teaching Cobol or the fundamentals of structured system development methodologies, this format is seldom successful.

Another reason for the existence, or should I say nonexistence, of MIS programs can be attributed to the "chicken-and-egg syndrome." There are relatively few four-year MIS programs and even fewer at the graduate level. Consequently, only a few people are graduated with the "ticket" (a terminal degree). Those that obtain a doctorate are lured to industry by salaries that are almost double a professor's salary. No professors, no MIS programs and — consequently, no graduates. I am certainly not advocating that industry lower its salary offers, but industry must recognize that the shortage of MIS specialists will persist until positive action is initiated by the industrial community.

Industry must reinvest in MIS education or risk losing its primary source of talent. In all fairness, industry has been generous in gifts of money and equipment, but the real shortage is people. An immediate solution to the university manpower shortage could be resolved through a "faculty loan" program. In such a program a company would "loan" a qualified employee to a college or university for a semester or up to two years.

Q I wish to differ with your reply to a question on the historic origin of "K." The intent of your answer was correct, but the suggested facts were misleading.

If expressed in octal, not decimal notation, 1,024 is exactly 1K. The confusion has no doubt resulted because people are too lazy to add the base (8). In other words, 4K of memory is exactly 4,096 (base 10) bits or 4,000 (base 8) bits.

A IF 1,000 (base 8) equals 512 (base 10) THEN you must be mistaken ELSE my computer is on the blink.

Long is a professor at Lehigh University, a DP consultant and author. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

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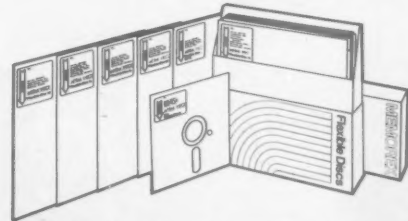
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Expansion Child's Play for Toy Manufacturer

MIDDLESEX, N.J. — Working with an outdated accounts receivable package is not child's play, as the data processing group for Knickerbocker Toy Company here realized last year.

The company's original accounts receivable software package was supplied by Honeywell, Inc. in 1978 when Knickerbocker, a subsidiary of Warner Communications, Inc., was concentrating on the stuffed or "plush" toy market.

By 1981 the firm's opera-

tions were expanded to include a new division in the giftware industry called "Applause." At this time, Knickerbocker's overall sales volume, including revenues from being the largest stuffed-toy supplier in the industry, had increased 191% from 1979.

Keeping Pace With Growth

However, the fact that its financial software did not grow to meet this demand threatened to hobble the company's accounting pro-

ductivity.

"Our old Honeywell software was cumbersome," Bill Ferrieri, director of corporate credit services, recalled. "When we made our first shipment from the new giftwares [Applause] division in March 1981 we were projecting up to 40,000 within two years. We needed a system that could keep pace with our growth."

Ferrieri headed the team assigned to select new accounts receivable software. After examining a variety of packages to determine which ones were capable of coping with Knickerbocker's growing customer base, the team was left with two finalists: Computeristics, Inc. and Fortex Data Corp.

The project team then conducted an in-depth vendor analysis that included presentations by both firms, user visits, demonstrations and reference checks. The factors held for review were basic system capabilities; vendor size, reputation and support; overall system expansiveness; and the availability of a report writer.

Recommendations from other users, plus a reputation for customer support and follow-up convinced Knickerbocker to choose Computeristics, Inc., according to Ferrieri. "We kept hearing good things about Computeristics from other credit managers. We had determined that Fortex didn't fit our needs. We looked at Software International Corp. too. When a reputable credit agency suggested Computeristics, we knew we had to check them out."

Smooth Conversion

The implementation of the Customer accounts receivable package began in late August 1981, with Computeristics personnel working closely with Knickerbocker's DP and credit staff to write new programs and to make modifications. All program revisions were completed by mid-September. The system was on-line and operational by Nov. 1, 1981.

"Conversion went very smoothly," Ferrieri said. "We were assigned a Computeristics project leader who worked with us on-site throughout the process." In addition, problems arose on the weekend of the conversion and Computeristics' representatives were reached at home and provided the information needed.

"Prior to our going on-line with Computeristics, five members of our accounting staff had to struggle every month to handle 2,500

checks and close the books on time," Ferrieri explained. "Our first month with Computeristics, one person did process 2,000 checks and had enough time to post them before closing the books. Computeristics' automatic cash application feature eliminated nearly 82% of our cash key-off work load."

He noted that the Customer package also identifies problem accounts and provides summaries that allow credit representatives to identify priorities for action.

"Our new system has the ability to handle any credit inquiry," Ferrieri said. "It can review files and tracks accounts on an ongoing basis. For the first time, we can select what we want from a file at any point and from any type of account."

Customer users at Knickerbocker also have access to daily activity registers, a listing of open cash by lock box and financial control reports, he continued. In addition, forward aging schedules are provided.

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Commission Picks Winner With State Betting System

LANSING, Mich. — Lottery aficionados may soon be able to play bingo along with a daily number because of an expanded betting system that will be installed by this state's lottery commission.

Lottery officials decided three years ago that the present lottery system, which consists of two Burroughs Corp. 7700 mainframes with terminals from Datatrol, Inc., was incapable of handling the nearly two-million-players-per-day volume, State Lottery Commissioner William Nugent said.

The officials opted for a new system based on a Marathon mainframe and about 2,800 Universal Transactional Terminal-101's from Syntech International, Inc. to install and maintain for two years.

The new system will provide advantages not available through the current system such as more redemption outlets throughout the state for faster recording of bets, Nugent said. Revenue from the daily game is expected to grow from \$420 million per year to \$495 million per year. Lottery officials will also have the option of adding new games like lotto, bingo, keno and possibly sports betting to the system via additional software programs, he said.

Winning numbers for the daily and weekly games are chosen on a forced-air machine, Nugent explained. The machine blows about numbered ping-pong-like balls. When the air supply is cut off, seven balls land in slots designating the winning number. Michigan has had a weekly lottery system since 1972; the daily game went into effect in 1977.

The state will begin by leasing the system from Syntech with an option to purchase after six months of operation. The purchase price would be approximately \$11.5 million paid over the next two years.

The vendor will install 1,300 of its own UTT-101 terminals, bringing the number in the state to 2,800. There are currently 1,500 terminals available for betting.

Syntech is responsible for maintaining as well as installing the system and will establish a computer center for its Marathon mainframe near Lansing with a backup system at lottery headquarters. The system is slated to be installed by late January 1983. Syntech will then have three months to replace the existing terminals with its own.

Although the vendor operates banking systems and a casino computer for monitoring slot machines in Las Vegas, the company has never run a state lottery game before, ac-

cording to Syntech Chairman Gordon Graves.

The system will use encrypted data for better security and employ a pipeline effect for better efficiency in handling large numbers of bets, Graves said. When communications are received from a terminal, a node will pick up the message and move it on to another. Immediately, the first node is cleared to receive new information, creating a "pipelined" effect.

The central computer is a microcomputer from Syntech's subsidiary company — SDS Systems — which contains a number of nodes tied together on a high-speed serial bus, he added.

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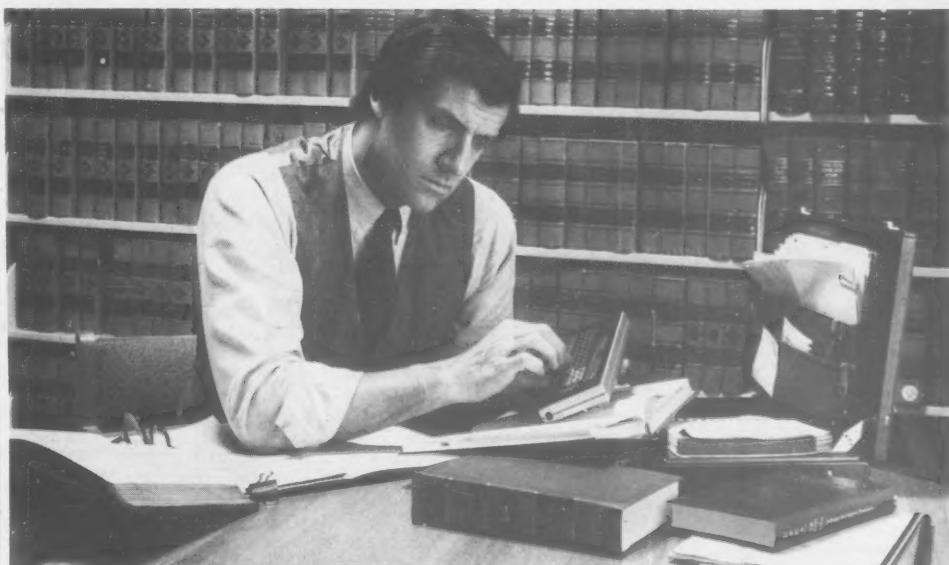
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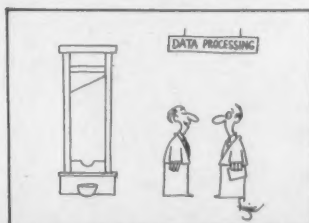
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Booksellers Turn to Computer To Keep Tabs on Stolen Rare Books

By Jim Bartimo
CW Staff

NEW YORK — While concern is mounting that computers may replace the printed word, the Antiquarian Booksellers' Association of America, Inc. (Abaa) is using a computer to save the printed word — from thieves.

Until now there has been no comprehensive record of missing or stolen rare books. Like expensive art, rare books are an easy mark for thieves, and with no records, a collector or dealer could inadvertently buy a stolen volume.

But the Abaa is using a computer data base called Bookline Alert-Missing Books and Manuscripts (Bam-Bam) to list those volumes and prevent collectors from being visited by the FBI. "If you bought a stolen book," said Katherine Leab of Bancroft-Parkman, Inc., "the FBI would come in and say, 'Sorry about the money, but...'"

Leab is editor of *American Book Prices Current*, which is published by Bancroft-Parkman. The company also maintains a data base containing the fair-market value of 180,000 rare books. They developed Bam-Bam for the Abaa with Inforonics, Inc., a Massachusetts-based text processing and computer typesetting company.

"The data base has a daily bulletin board that is something like electronic mail," said Lawrence Buckland, president of Inforonics. "Sometimes it takes a while to enter the books by author and title so a dealer can just look at the last 10 or 12 entries to see what's there."

In addition to providing a service for collectors, it is expected that law enforcement agencies will use the data base. "A computer system like this is very useful," said New York art crime detective Bob Volpe. "From a law enforcement point of view it will save time in going through long lists of books."

Since the system has been in use

DP Job Net Available

LEXINGTON, Ky. — An automated nationwide employment data base that matches computer personnel to specific requirements of hiring companies has been established here by Computerized Personnel Network, Inc. (CPN).

Utilizing twin Digital Equipment Corp. VAX 11/780 computers, Tymnet, Inc.'s packet-switched network and Bell Laboratories Wats communications, the system structures the candidate's search for client companies. Searchable variables include career history, geographic location and preferences, salary requirements, academic background and specific job skills.

The company charges \$5 for computer personnel to have their resume data confidentially entered into the data base and \$60/hour for prospective employers to access the data base. CPN can be reached through P.O. Box 4097, Lexington, Ky. 40544.

since January, Leab said that one book thief was captured when he tried to sell a stolen volume to a dealer who called up the data base, saw the book was newly listed as missing and informed the police. "This is how these things happen with rare books," she said, "Either they turn up immediately or they go underground for a long time."

Leab said that the data base will be effective because book dealers and collectors, unlike those in art circles,

are not interested in purchasing stolen works.

Bam-Bam currently lists 5,000 books worth \$5,000 or more. The on-line system runs on a Digital Equipment Corp. Decsystem 2020. The software, developed by Inforonics, is the Text Processing Service, which is also used by publishers and libraries. Members of the Abaa can call up the data base for a \$10 fee and a dollar per minute search charge, according to Leab.

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Oil Execs Find Unplanned Ways to Use Packages

FORT WORTH, Texas — Top executives who have found financial analysis packages a helpful tool in corporate planning aren't always willing to use those packages in the manner originally intended.

At Western Co. of North America, for example, top corporate officials wanted to know the company's earnings per share in a variety of situations. That is the kind of request that can cause pain for a DP manager, the firm's region controller, Ken Pickel, said. It basically requires the firm's financial planning software to work backwards through a string of complex, simultaneous equations.

Western Co. is said to be one of the six largest oil well service firms in the U.S. The company uses IBM 3031 and 3033 processors; the financial modeling is carried out on the 3033.

Pickel said that Western Co. solved the problem of difficult requests by installing an Interactive Financial Planning System (IFPS) developed by Execucom Systems Corp.

The package is written in a user-friendly language, which managers can use without the intercession of the DP department, according to Pickel. The result, the region controller said, is that managers get the information they want, but the DP department doesn't have to revamp its schedule to provide the information.

"In 1980 the company set up a large study group to determine our systems needs. I worked with a small committee to look at the modeling software aspects. We began by talking to ultimate users and vice-presidents," Pickel said.

"We thought the issue so important that assessment went on for several months. In the second stage, when we had determined our needs, we looked at 12 different packages. We even considered time-sharing, but decided it was too expensive. In general, the package for us had to provide our senior management with an extensive and detailed business fore-

cast," Pickel said.

In the year after installing the IFPS package, the company built four major models. A tax-planning model was ready in March 1981, a month after the IFPS package was installed. A strategic-planning model was ready in June, followed by group financial-planning and merger-acquisitions models. Pickel noted that only one person in the model development group had programming experience.

"We use the models in both of the major operating groups within the corporation. The financial planning model, for example, is flexible. Once it's loaded with data we can vary the revenue figures, and then the model will tell us if we have enough equipment and employees to create the

higher revenues. If new equipment and employees must be added, the model will calculate the cost of the additional equipment and labor," Pickel said.

The strategic-planning forecast model produces quarterly reports, prepares a balance sheet, a debt and interest analysis, roll-forward account analysis, a financial summary and a variance report, according to John Swaim, a time-sharing analyst at the firm.

Swaim, one of the principal developers of the models, said, "The great value of a program like this one is its separation of logic and data. We can play around with various techniques for financing capital outlays. We specify the amount we wish to

spend, then the model forces a balance between cash inflow and outflow through a loop of simultaneous equations. Finally it borrows money for the required balance and computes the interest on it."

The acquisitions model, which Swaim also helped develop, is the most complex of the four modules.

"First, we load the data on the parent company, then data on the target company and finally decide on how we want to finance the acquisition." The processor generates a set of pro forma statements for the parent company, target company and merged company. The model also is capable of running a series of scenarios using different offers and financing arrangements, Swaim said.

DATA SWITCH BUILDS CONFIGURATION MANAGEMENT SYSTEMS FOR MULTIPLE PERIPHERAL SWITCHES

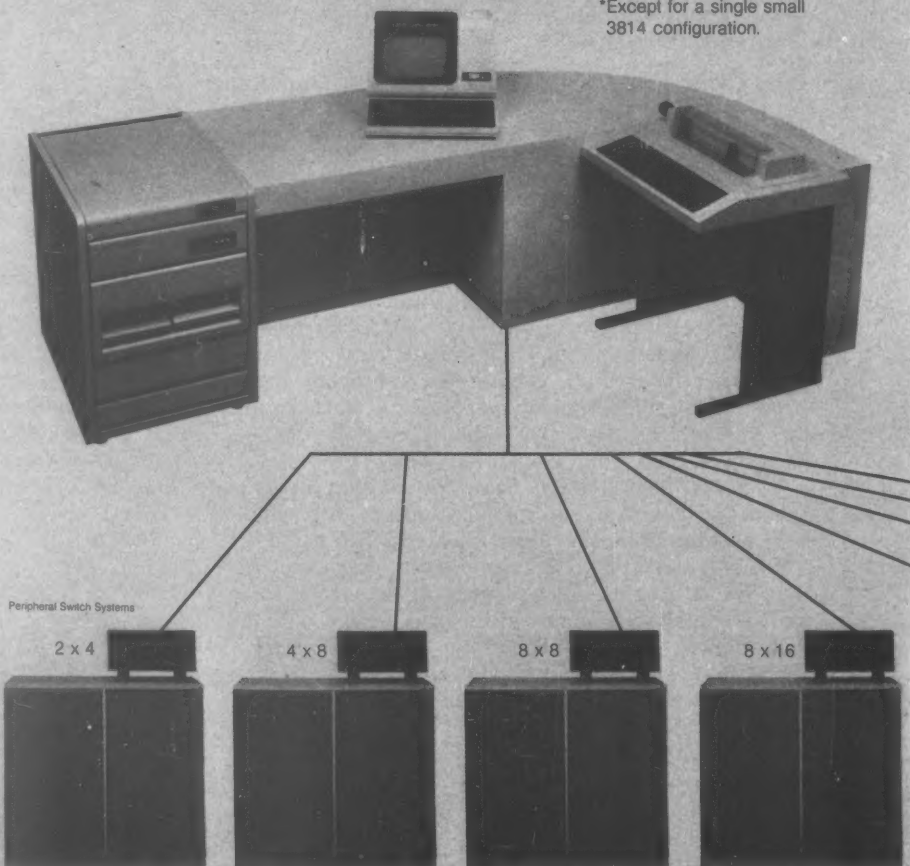
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Officials Gush Over Success

Alaska Pipeline Pumps Information Quickly

ANCHORAGE, Alaska — First it was dogsleds, then radio, then airplanes. Today a computer-based electronic mail service, developed by Alyeska Pipeline Service Co., carries memos and company data to pumping stations located along the 800-mile Alaska oil pipeline.

Alyeska, which built and runs the pipeline, requires quick communication between the 12 pumping stations located on the pipeline, company owners and the federal agencies involved with the pipeline.

Because the firm acts as custodian of the oil as it travels across Alaska from the North Slope to Valdez, it must provide an exact accounting of all oil

that flows through the line, according to William Caringer, manager of systems computing for Alyeska.

Eight companies own Alyeska, including Amerada Hess Pipeline Corp., Arco Pipe Line Co., Sohio Pipe Line Co., Exxon Pipeline Co., Mobil Alaska Pipeline Co., Phillips Alaska Pipeline Corp., Union Alaska Pipeline Co. and BP Pipelines, Inc. Several federal agencies are also involved since a large part of the pipeline runs across federal land, a spokesman said.

To handle its communications needs Alyeska developed an electronic mail network called Message Processing System (MPS) in 1977,

which operates on the company's IBM 3031 computer located in Anchorage. Remote IBM 3278 terminals located in the company's pumping stations are linked to the processor via microwaves, with IBM 3287 printers providing hard-copy printouts of memos and messages.

Alyeska has telephone backup, Caringer said, but for expediency the company uses electronic mail. If a part is needed at a pumping station, it can be ordered and often delivered within 24 hours. Since temperatures can fall to 70° below zero after dark in winter, getting parts quickly can be crucial to the station's operation.

Before 1977 the company used a

Data General Corp. 2000 minicomputer with Winchester disk drive for electronic mail use. Since the company used its IBM 3031 for other message uses, such as ordering supplies and equipment, company officials decided they wanted the electronic mail system to be compatible with the IBM mainframe, Caringer said. The electronic mail application was added with the IBM's other applications, he explained.

Data processors at Alyeska took six months to rewrite the program used on the DG 2000, Caringer said. More than 500 preformatted screens were created to cover almost any message that might be sent over the network, and company employees at all levels were taught how to use the terminals, he added. Users can look up messages sent up to 30 days prior and find what action was taken on them.

Sending Messages

To send messages, employees use an operation manual to determine the type code for the message they want to send, he explained. A code is then typed on the terminal keyboard and the preformatted message appears on the screen. Users then fill in the blanks with specific information and then forward the message by use of a second code.

The system uses CICS to provide an interface between the operating system and user-written application programs, Caringer said. CICS provides many of the facilities necessary for terminal applications, such as message switching, inquiry, data collection, order entry and conversational data entry.

The system does not carry personal mail at all times, according to Caringer. Phone communication is possible between all pumping stations, he added, but for immediate communication with hard-copy backup, the electronic mail system is used.

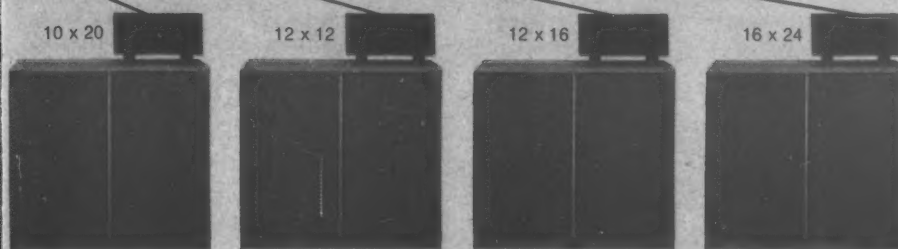
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Grocery Chain Registers Profits With 100 Terminals

SALISBURY, N.C. — How does a small 13-unit chain of discount stores with only a quarter of the stock of most large supermarkets make a net profit nearly six times that of a large food store?

Low prices, low operating overhead and a heavy dependence on computers and electronic cash registers, according to Albert Gubay,

president of 3 Guys, Inc.

3 Guys grocery stores go against the grain of conventional shopping establishments. Shoppers usually tread clean, but bare, cement floors. The wooden checkout stands are homemade, and the prices of food items are marked on cardboard signs strung from the ceiling. Food products are displayed

"warehouse style" in their original cartons and along 12-ft-wide aisles.

The average 3 Guys grocery store stocks about 2,000 items, about one fourth the amount kept in a regular supermarket. However, at the end of this year, the chain will average a net profit of about 4.3% based on \$100 million in sales — while the average supermarket will have a net profit of only .78%, Gubay said.

Eliminates Keying

3 Guys has about 100 NCR Corp. Models 255 and 2552 terminals installed in its stores, equipped for scanning so that there is no need to stamp prices individually on products. The scanners not only eliminate keying, but allow the average 15 workers per store to check out more customers per hour at an average rate of 32 items per minute.

The terminals in each store are linked to in-house NCR Model 6060 and T8254 processors. With the dual processors, if one processor goes down, the other will take over operations in about 30 seconds, Gubay said.

With the NCR equipment, managers at each store look at exact unit sales figures for every product on a daily basis, Gubay said. The system not only tells what was sold, but gives the cash, coupon and check sales, deposit and cash-on-hand figures. The NCR terminals also maintain check verification files so that customers can write checks instead of paying in cash, he added.

Scanning Checkout Lanes

The average 3 Guys store has seven scanning checkout lanes. Each NCR electronic sales terminal and scanner is positioned in the center of a lane and is flanked by two aisles to accommodate shopping carts, Gubay pointed out.

To check out, a customer pushes a loaded shopping cart into one of the aisles and an empty receiving cart into the other. After items have been scanned and the prices recorded, salesmen transfer the items from the loaded cart to the empty cart, according to Gubay.

The NCR system uses the prices and item identifications to maintain inventory and to order new items when stocks are low, according to Gubay.

To handle the small amount of items that do not carry product codes, 3 Guys assigns look-up codes that identify that item to the computer.

A Harris computer raised the curtain on the new Anvil-4000 CAD/CAM software.

How did a software developer introduce a CAD/CAM software system that industry is calling the most complete package in town?

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HARRIS

Hotel Tracks Reservations With Computerized System

SILVER SPRING, Md. — How do you tell someone with a confirmed reservation that there are no hotel rooms available? Quality Inns International, Inc., which is based here, hopes that its recently installed computerized reservation system will never let that question be asked.

Dubbed Sunburst, the system can process up to 50 message/sec for some 1,000 Quality Inns. Company officials expect the system to handle existing reservations as well as to book reservations for the additional 15,000 rooms the hotel chain plans to open within the next year.

Designed around two IBM 4341 Model Group 1 processors with 4M bytes of main memory each and three Series/1 distributed processors based in Phoenix, Ariz., the system has been in operation since January, according to Ray Z. Franks, vice-president for Corporate Information Systems.

Reserving A Room

A call for a room reservation in some 500 Quality-, Comfort- or Quality Royale Inns is handled by 110 part-time operators at the Silver Spring reservation center. The operator uses an IBM 3101 display terminal to enter the customer's name, address, date of arrival and departure and other necessary booking information. The operation takes about three minutes, but company officials hope to cut 30 seconds off that time, Franks said.

Using the system, the operator can obtain a display of information about a Quality Inn at any location. After punching a few keys, the operator can tell the customer where the room is located, how far the motel is from downtown or an airport and what transportation is available, Franks said.

The Sunburst system obtains dynamic, or periodically changing, information from the 4341s in Phoenix. Static, or unchanging, information is stored in two Series/1 processors in Silver Spring. This keeps communi-

ACM Offers Award For Top Ph.D. Work

NEW YORK — The Association for Computing Machinery (ACM) has announced the establishment of the ACM Doctoral Dissertation Competition and Award to be given to the author of the best doctoral dissertation in computer science and engineering.

The award will be presented annually at the ACM Computer Science Conference in February. The MIT Press will publish the winning thesis and up to four honorable mentions. The winner will receive \$1,000 plus a royalty on sales of the published version. Honorable mention recipients will also receive royalties.

Nominations of dissertations are generally limited to one/university. Dissertations are to be forwarded by the thesis advisor with endorsement of the author and the department head on a one-page submission describing the significance of the work July 1 to the ACM at 11 W. 42nd St., New York, N.Y. 10036.

cations costs down, Franks said. "There's no reason to go to Phoenix for [motel] rates which don't change."

In addition, travel agents who frequently book rooms with Quality Inns have their own identification number. An operator can enter that number into the terminal to get information about the agent, Franks said.

Sunburst can also deal with "airline." That is, the system uses airline control programming and the same coding for cities as the airline reservation systems. This allows Quality Inns to work closely with travel agents, Franks said.

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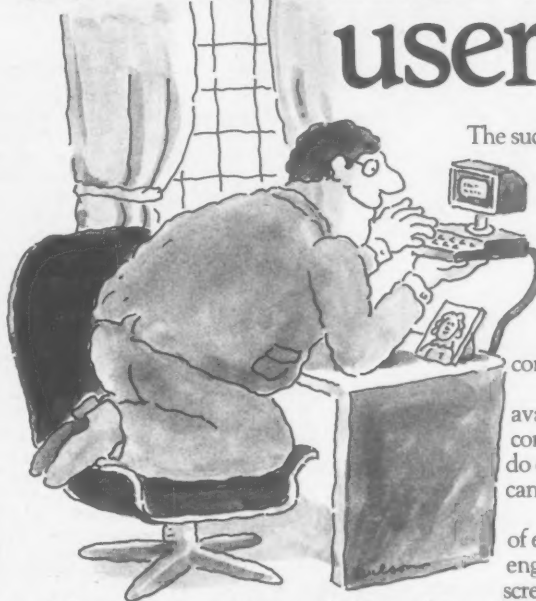
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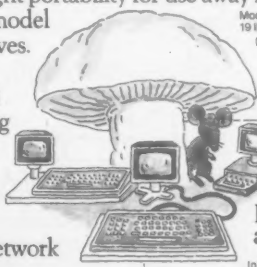
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Virginia Bank Cashes In on Scheduling System

RICHMOND, Va. — Innovation isn't a new word around First & Merchants Bank (F&M) here. The \$2.5 billion bank, the third largest in Virginia, was the first in the state to offer a 24-hour banking service through automated teller machines. The headquarters complex has been a catalyst for the revitalization of one of Richmond's historical areas. Its trust department is rated among the top 100 in the U.S.

The theme of innovation is prevalent in the bank's DP facility, too. The facility runs an IBM 3032 and an Amdahl Corp. 470V/8 in an MVS en-

vironment, soon to be converted to SP1. It was innovative thinking about three years ago that prompted data center management to decide to convert the center from a manual, card operation into a modern, real-time, on-line operation.

"We had one person who was scheduling all the work, and we knew we'd have to change the way we operated if we were to grow with the bank," according to Arnold Farber, computer operations manager. "This meant installing a scheduling system that would automate our production control area."

Farber and Rosemary LaChance, manager of systems assurance, found the product they were looking for — University Computing Co.'s UCC Seven Automated Production Control System. Farber said it was the only production control system they saw that was doing everything that the vendor promised.

On-Line Evolution

After the product was installed, F&M's evolution began. In implementing the new system, LaChance defined her work load and objectives. When it came time to convert that first job to UCC Seven, she chose a familiar job that was not too difficult.

With that first job converted, others quickly followed. LaChance converted the jobs on the night shifts first and then tackled the day shift. She found that she did not have to know what files were needed for the jobs because once the job was loaded, the production control system took over. All she had to do was locate the job control language, load the job and define when it would run and when the next job would run.

When she was familiar with the system, she began training the DP department to use UCC Seven. She emphasized that this training mostly consisted of changing the way people thought about performing production work.

"Once our staff learned to use the terminals — to think on-line instead of paper — they discovered there was even less work than before. They found that everything they ever wanted to know is available through UCC Seven; that you can get the same information on-line that you can on paper and much faster," she said.

Now, a little more than three years later, with the F&M center fully evolved to a real-time environment,

Farber and LaChance are realizing the goals they set out to achieve with UCC Seven.

"All our production work is scheduled," said Farber. "That amounts to 17,000 jobs a month with about 70,000 steps. Although our work load has increased by at least 25%, we've been able to reduce our staff by about 20%." He noted that the staff reductions came about as employees moved up to other positions within the data center or left F&M.

Because everything is automated, DP personnel can quickly answer users' questions regarding the status of their jobs. This ability eliminates a lot of calls to the I/O area.

In his position as computer operations manager, Farber finds the management reporting feature to be a big help.

"Each morning, just by using a single report provided by the system — which includes the reasons for absences — we can review an entire 24-hour period in about a two-minute span," he said.

Another area where the production control system has really helped is with the interface between CPU jobs and manual tasks, which the DP center performs as the processing area for a large bank. Before the system was installed, F&M experienced a number of reruns caused by lack of coordination in these interfaces. Nothing can be processed until the application is in the right place at the right time with the right file. An example of this is the accounting end-of-month processing. It used to take F&M 48 hours and a lot of confusion to process this system. Since converting it to UCC Seven, the system normally runs in 12 hours.

July Meet to Cover Mail Automation

PHILADELPHIA — "The Expanding Dimensions of Automation in Information Processing" will be the theme of the Recognition Technologies Users Association Summer Conference to be held July 18-21 at the Philadelphia Marriott here.

Other topics to be covered at the conference include "Automating the Mail Using Voice Recognition" and other applications utilizing image, mark read, voice and optical character recognition.

Registration fees are \$280 for member companies; \$350 for nonmembers. The association can be reached through P.O. Box 2016, Manchester Center, Vt. 05255.

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Texas School System Charts Students' Courses

TARRANT COUNTY, Texas — A computer application for student degree planning at Tarrant County Junior College is getting an A+ from school officials here.

An IBM computer and several on-line terminals scattered across the school's three campuses have simplified life for Tarrant counselors and students alike, according to a spokesman.

Working at a terminal, a counselor calls up a report that shows the student precisely what courses he must complete to earn his two-year degree, and the student gets a hard copy of his requirements from a nearby printer.

"We were spending an hour or more on each student," said Joseph W. Rode, director of counseling, placement and testing at the school's northwest campus. This was creating big problems, according to Rode, with enrollment at the college bulging at 25,085 in 1981.

"It took at least 15 minutes to hand-copy facts from the student's permanent records onto the degree planning sheet. Then a secretary would type the whole thing on a three-part form... even if a secretary was available on the spot, the student had to

wait half an hour or more. Usually we'd have to make another appointment to finish the counseling and get a degree plan squared away," Rode commented.

Now the student's transcript, permanent record and degree program are all generated from the data banks of the school's IBM 370 Model 138 mainframe. An IBM 3287 printer then produces for the counselor the entire academic story: courses completed, courses pending, additional requirements and their sequence and hours needed toward degree completion.

"The counselor really has no excuse for making a mistake in advising a student," Rode continued, "and the same is true for the student."

The document is complete and concise, Rode said. It succinctly spells out grade point average, transferred credit hours, upper-level hours completed and more. The instant tapping into the student's college history provides a useful tool in making other academic plans as well, Rode explained.

Major Changes

"Students frequently want to change their majors and no counselor can possibly remember the different requirements," Rode said that before they installed the computer, counselors were forever thumbing through the college catalog to figure out, for example, what completed courses a business student could ap-

ply toward a new major in agriculture. "It took a lot of time, and with 140 courses there was plenty of room for error," he claimed.

"Now we just instruct the system to adjust that old degree plan to the new requirements, and we have the whole story in a few seconds — no mistakes," Rode remarked.

While some advisors were originally worried about the impersonality of the new system, they soon found that the IBM printout did not replace or undermine academic advisement, but instead enhanced it, enabling them to be more useful and accountable to the student body.

"Today, really for the first time," Rode concluded, "I'm a full-time counselor, not a part-time clerk."

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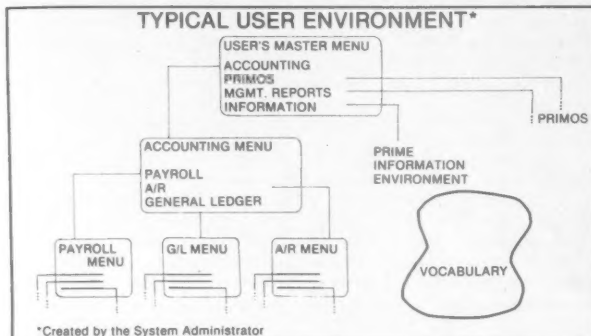
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County Court Goes On-Line To Arrest Case Confusion

LAS VEGAS — Monitoring the progress of the 28,000 court cases that are now moving through the Clark County judicial system has been eased by an on-line system installed here last November.

A major advantage of the court management system is the elimination of the guesswork that sometimes enters into the court calendar. This calendar, a schedule of hearing dates agreeable to all parties of the case, is established by the county judge and maintained by the computer.

Last minute rescheduling of cases, known as continuances, are considered one of the most costly activities of operating a court, running into millions of dollars for judges' salaries, pay for police officers testifying at trials, clerical processing and pay lost by witnesses. The system, known as the Clark County Case Tracking System, monitors those continuances.

Data Entered Directly

The various people involved in building a case can now enter data directly into the system, Martin A. Trishman, DP director for Clark County, explained.

The Clark County system is based on the Prosecution Management Information System developed by the Institute for Law and Social Research and later expanded by the institute and IBM. This system was modified in-house by an analyst working for Clark County who broadened the system to include many of the legal offices contributing to a court case in addition to the courts.

Besides county judges, local police

departments and the district attorney's office are now hooked into the system via locally installed terminals, Trishman said. And public defenders and district courts will soon be going on-line.

1,000 Subpoenas

During an average week, about 1,000 subpoenas are issued in the county. These used to take hours to research and prepare, with no assurance for accuracy. Now clerks enter data at terminals and all subpoenas for a particular case are printed at one time. If a court date is later changed, all the subpoena reporting dates are immediately changed.

The police department finds the system useful in learning the disposition of cases and in better managing police officers' court appearances. For example, police officials are now better able to determine whether the police officer's time spent in court is excessive and reschedule appearances as needed.

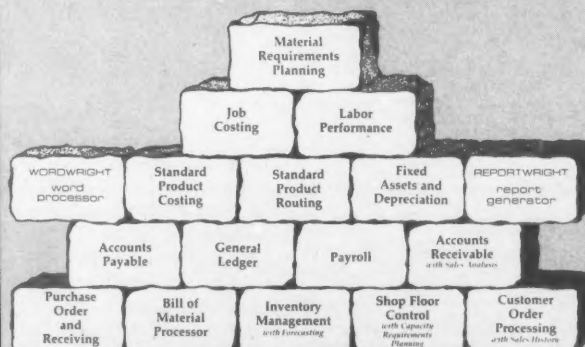
Cutting back on repetitious activities is a major benefit of the system, Trishman noted. A single jail booking might previously have generated as many as 60 copies of the arrest information. Now that information is entered into the county's IBM 370/158 system and becomes available to all on-line parties.

The county is in the process of upgrading its hardware to two IBM 4341 Group 2 systems. Trishman said the upgrade is going smoothly.

As various county government offices become more familiar with using the system, requests for ancillary reports are mounting, Trishman said.

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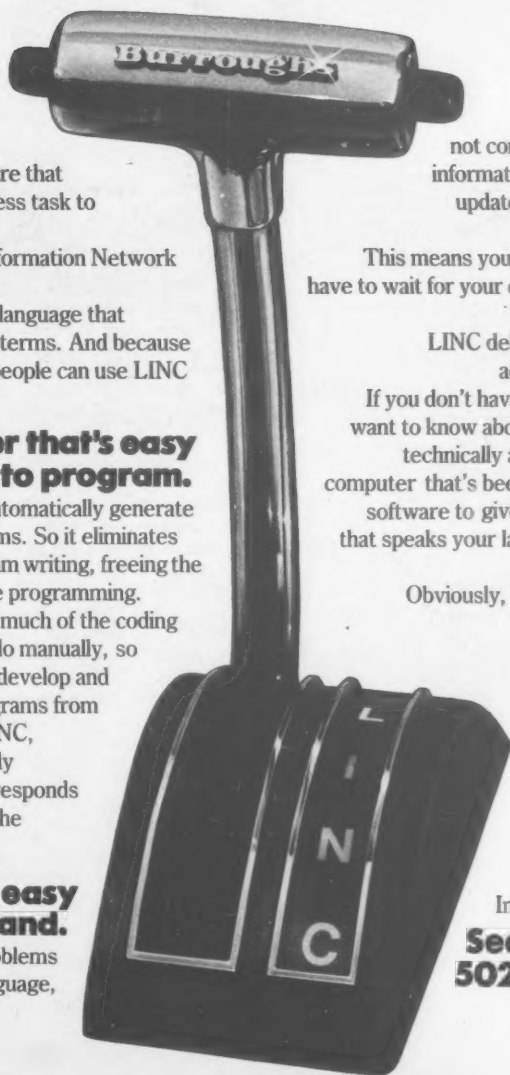
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System Rescues Court From Red-Tape Blizzard

KALAMAZOO, Mich. — When District Court officials here recently found themselves literally buried in paperwork, the court had to computerize its operations — and do it quickly.

Faced with a backlog of some 18,000 unprocessed traffic tickets and a disorganized record keeping system, Kalamazoo's Ninth District courthouse was in "a desperate situation that needed to

be resolved quickly. We had to find a computer that would put things in order," court administrator John Whitmyer recalled.

The District Court deals extensively with the public and generates a lot of documents. Traffic violations, as well as criminal and civil cases are processed, along with accompanying judicial or probate actions. Weekly hearings are scheduled and,

if necessary, juries are impaneled. Some records, such as abstractions of convictions (which transfer penalty points to the drivers' licenses) are regularly sent to the Michigan secretary of state. The court also provides the state's chief justice with a list of cases that have not been disposed of in 90 days, Whitmyer said.

Before installing the \$70,000 system — a Wang

Laboratories, Inc. VS/WP processor with 256K bytes of main memory, four terminals, a daisywheel printer and 90M bytes of disk storage — the court had 46 employees to handle more than 30,000 traffic infractions and 13,000 civil and criminal suits a year. Whitmyer said operations were so inadequate that it was frustrating both the employees and the public.

"Trying to find someone's traffic ticket was like looking for a needle in a haystack. Names and drivers' license numbers were incorrect, folders were misfiled and could be located in any number of places," he said.

Scheduling hearings was another problem. "Basically it was guesswork," Whitmyer recalled. "We had no knowledge of the history of the case, or even if the litigants would be opting for a jury." By September 1980, the court literally became inundated with paper.

"It became impossible to keep up to date. Paper was piled everywhere and we were running out of space. We either had to hire more people and add onto the building or automate," Whitmyer said.

The court chose the latter option and Whitmyer issued a proposal inviting corporations to bid on supplying a word processing system. The court wanted a system that would require a minimum of internal reorganization — easier said than done.

"[Some] companies wanted me to restructure my record keeping to fit their prepackaged hardware and software. I had neither the time nor human resources [to do it]," Whitmyer said.

The court chose the Wang system and Whitmyer hired three students who had trained on the court system. The students, Whitmyer said, developed the necessary methods needed to convert from a manual to a computerized system.

After several months, the court not only caught up with its ticket backlog but also increased revenues by 60%. Whitmyer said the court eliminated two full-time clerical positions, reassigning those employees to other duties.

In processing traffic violations, the system updates and logs indexes of tickets. It also keeps records of payments, points added to drivers' licenses and keeps track of dispositions, Whitmyer said.

In addition, records are maintained for civil and criminal court docketing. Names are alphabetized along with the appropriate case number. About 75% of case inquiries can be answered by using the system, Whitmyer said.

The court recently upgraded the system to 512K bytes of memory and added three more terminals. A 430 line/min printer was added along with a tape drive and additional disk storage. Whitmyer said the court plans to use the enhancements to completely automate its operations.



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Uses UPC Scanner

Supermarket Finds Thrifty Way to Check Out

TOLEDO, Ore. — Sid Neal's Hillcrest Thriftway grocery store here is able to check out nearly twice as many items hourly since it installed a Universal Product Code (UPC)-reading electronic checkout scanner.

The IBM device is linked to a computer that electronically tallies purchases, speeds cash flow, monitors trainee's skills, schedules employee work shifts and alerts the store to bad checks.

The checkout scanner system does more than speed shopping. Neal relies on the computer to help manage a business that features large volumes and low margins — an operation in which even a small rise in

productivity can mean survival.

"Shoppers are very cost-conscious in today's climate of escalating prices," Neal said. "If prices are a few pennies lower elsewhere, they'll go there. The only way supermarkets can survive is to turn to computers. Computers can help food stores keep prices from rising and in some cases might even lower them."

Neal's Thriftway store is part of a cooperative purchasing group, each store independently owned and operated. United Grocers of Portland is Thriftway's main supplier. It also uses IBM computers to help run its business.

The Thriftway store has an unusual

checkout configuration featuring a scanner, scales, keyboard and special conveyor belt. The configuration can double the speed of checkout. Shoppers' carts were designed to fit over the conveyor belt, which moves purchases to within inches of the scanner.

"Our checkers handle 400 to 500 items an hour with the scanner, compared with the previous manual operation of 300 items," Neal said. "This is a large productivity increase."

Store Configuration

The store has six checkout stands for customers and one for manage-

ment's use. They are linked to an IBM 3651 store controller, a processing device designed for retail environments that can store the market's entire inventory file of 22,000 items plus accounting and negative check files.

Most store items carry a UPC that is computer-readable. The code identifies the item and its weight or volume.

As items pass over the scanner, it reads the UPC electronically and transmits the information to the 3651 controller, which retrieves prices from its files and relays them back to the checkout stand. There they are printed on the cashier's tape alongside the items' description.

"We've eliminated the time-consuming, error-prone task of having employees stamp prices on each item, an activity that is unproductive and adds nothing to a product's value," Neal said.

Customers determine item costs through labels on the store's shelves.

Price Changes

Prices are changed twice weekly: on Wednesdays for advertised items and on Fridays for regular products.

In both cases, the procedure is the same. The day before the change, United Grocers' computer transmits new prices to Thriftway's store system through a telephone link. The warehouse also ships computer-generated labels in time for shelf display the next morning.

"Getting hundreds of price changes ready quickly and accurately means substantial savings," Neal said.

In the front office, automation assures better cash-flow control and helps evaluate trainee skills as well as devise optimum work schedules.

Because every transaction is recorded in computer files, management can determine at any time the cash amount at each checkout register. When excessive cash builds up, it quickly is deposited in the bank.

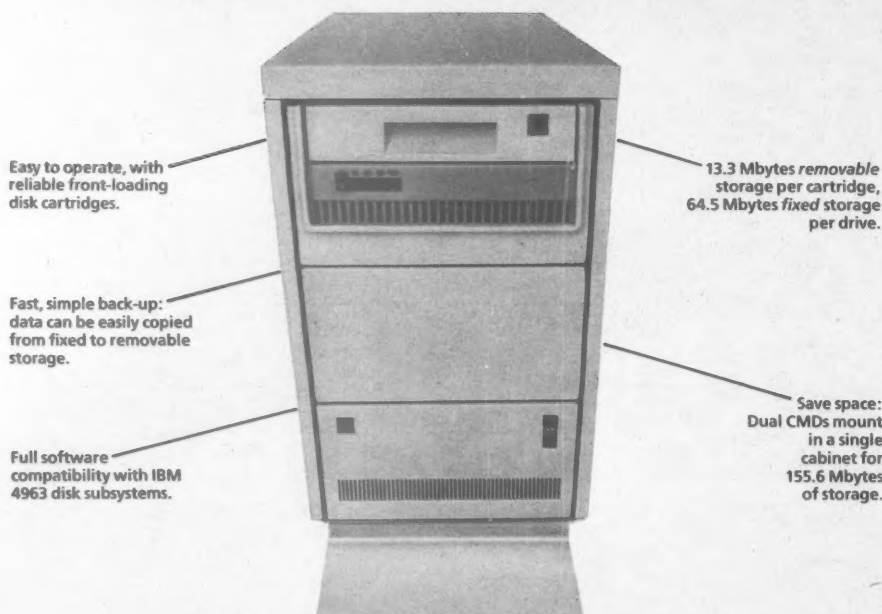
Each checkout stand can be monitored from the office or from another checkout stand, a helpful function for reviewing the progress of trainees.

The system also helps schedule shifts. Less skilled checkers are assigned to slower hours.

Another feature of the system helps the store track check cashing. Each time a check is presented, the clerk matches it against the bad or bounced check file. Checks that are filed are then referred to store management for action.

Neal summed up: "The scanning system will help keep prices down, attract more customers and let us efficiently handle the increased volume of business in a profitable way."

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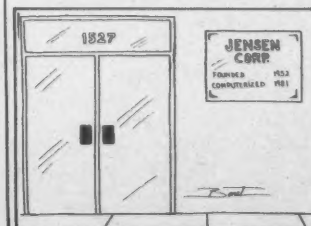
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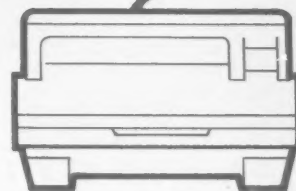
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Call For Papers

BETTER EMPLOYMENT OF SITE THROUGHPUT (Best) HP-3000 Users Conference '82, Salt Lake City, Aug. 25-27.

Best is accepting papers for presentation at its second annual conference. Subjects include system optimization, program optimization, programmer performance optimization, site management and operational optimization.

Title and abstract should be submitted before July 15 to Marlene Austin, Bonnerug, 438 E. 2nd S., Suite 4, Salt Lake City, Utah 84111.

LOCAL-AREA NETWORKS '82, Los Angeles, Sept. 16-17.

Local-area networks '82 is inviting papers for presentation. The conference will focus on key issues of the applications and design of local-area networks, such as architecture, protocol, baseband vs. broadband, standards problems, office, laboratory and industrial applications. Both invited and contributed papers on local-area networks will cover technology, applications and standards as well as market potential and economics of various types of local-area networks.

Suggested topics for sessions are due Feb. 15. Title and abstract (500 words) are due March 1. Submissions should be mailed to Ellen M. Bond, Director, Expositions, Information Gatekeepers, Inc., Suite 111, 167 Corey Road, Brookline, Mass. 02146.

NATIONAL TELESYSTEMS CONFERENCE (NTC) '82, Galveston, Texas, Nov. 7-10.

NTC is seeking original papers for publication in the conference record. Possible subjects include, but are not limited to, the following topics: satellite communications systems, terrestrial communications systems, launch systems, navigation systems, electromagnetic compatibility/interference, remote sensing systems, radar systems, spread spectrum systems, digital avionics systems, state-of-the-art technology, telecommunications electronics, system simulation, test and evaluation.

Five copies of the completed manuscript and one copy of the abstract are due June 15 and should be mailed to Dr. P.M. Hopkins, Lockheed-EMSCO, Mail Code C-22, 1830 Nasa Road 1, Houston, Texas 77258.

CAUSE NATIONAL CONFERENCE '82, Hilton Head Island, S.C., Nov. 30-Dec. 3.

Cause is inviting papers that support the conference theme, "The Information Resource: A Management Challenge." Topics include issues in higher education, managing the information systems resource, technology and techniques, small college information system and innovative applications.

Abstracts are due July 15 and should be mailed to Cause, 737 29th St., Boulder, Colo. 80503.

COMPUTER NETWORKING SYMPOSIUM '82, Gaithersburg, Md., Dec. 9-10.

Institute of Electrical and Electronics Engineers' Computer Society is accepting tutorial proposals for presentation at the symposium. The theme of the symposium is "Planning for the Near Term: The Next Three Years." Proposals should contain an outline and an indication of the educational level at which the tutorial will be presented.

Proposals are due Aug. 1 and should be sent to Dr. Joseph B. Williamson, Mitre Corp., 1820 Dolley Madison Blvd., McLean, Va. 22102.

Free Brochures

• "How to Make Quality Circle Programs Work Better," a new study reprinted from *Canadian Business*, details the experience of 41 American companies with such programs. It can be obtained from Dr. Woodruff Imberman, Imberman & DeForest, 209 S. LaSalle St., Chicago, Ill. 60604.

• "How to Save Money on Computer Repair" describes how most end users and OEMs can save a substantial amount of money on computer repairs. It is available from Digital Data Systems, Inc. 1551 N.W. 65th Ave., Plantation, Fla. 33313.

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June 23-24, San Francisco — **SAS Basics Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

June 23-24, Cambridge, Mass. — **Distributed Systems: Concepts/Management Overview.** Contact: The Datamation Institute, Seminar Coordination Office, Suite 415, 850 Boylston St., Chestnut Hill, Mass. 02169.

02167.

June 23-25, Seattle — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earlham, Orangethorpe, Calif. 92669.

June 23-25, Los Angeles — **Network Communication Protocols.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earlham, Orange, Calif. 92669.

Calendar

June 23-25, Arlington, Va. — **SAS Regression & Anova Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary, N.C. 27511.

June 23-25, Chicago — **Microcomputer Systems: A Guide to Selection and Application.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 23-25, Washington,

D.C. — **DP Operations Today: Effective Scheduling and Console Operation.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 24, Detroit — **Comprehensive Electronic Office Management.** Contact: Karen Burman, Data General Corp., 6905 Telegraph Road, Birmingham, Mich. 48010.

June 24-25, New York —

Data Communications: Advanced Concepts and Systems. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 24-25, Boston — **Data Dictionary.** Contact: Computer Education Services, 739 Boylston St., Boston, Mass. 02116.

June 24-25, Atlanta — **Successful Business Graphics.** Contact: National Computer Graphics Association, Eloise Wenker, 2033 M St., N.W., Washington, D.C. 20036.

June 24-25, New York — **IMS Data Communications.** Contact: Chubb Institute Advanced Training Center, 480 Morris Ave., Summit, N.J. 07901.

June 24-25, Washington, D.C. — **Local Network Equipment: Developments and New Offerings.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

June 24-25, San Francisco — **IBM's Systems Network Architecture: A Master Plan for Teleprocessing.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 24-25, Seattle — **Advanced Disaster Recovery Planning.** Contact: Delvin Associates, Inc., Suite 795, 1150 First Ave., King of Prussia, Pa. 19406.

June 24-25, Englewood Cliffs, N.J. — **IMS Systems Management Workshop.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

June 25-27, Boston — **The UCSD P-System Users' Society.** Contact: Charles Chapin, Usus, P.O. Box 1148, La Jolla, Calif. 92038.

June 26-30, Summit, N.J. — **CICS Command-Level Programming.** Contact: Chubb Institute Advanced Training Center, 480 Morris Ave., Summit, N.J. 07901.

June 27-30, Houston — **Systems Software.** Contact: University Computing Co., Exchange Park, Dallas, Texas 75235.

June 28-29, Washington, D.C. — **ADA-Dod's Standard Programming Language.** Contact: Data Processing Association Education Foundation, P.O. Box 91295, 5959 W. Century Blvd., Los Angeles, Calif. 90009.

July 28-29, San Diego — **Software: A Legal Briefing for DP Professionals.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

June 28-29, Chicago — **Data Administration: Successful Techniques.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

(Continued on Page 54)

TeleVideo's 16 Bit Breakthrough

INTRODUCING THE TS 8000 SERIES

16 Bit microcomputers that are compatible with TeleVideo's 8-bit multi-user, multi-tasking system.

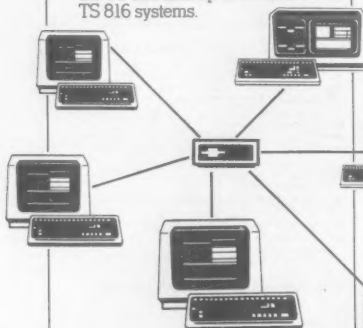
PRODUCT: TeleVideo's TS 8000 Series 16-bit small business computers.

CONCEPT: High speed and mass storage capabilities in small business computers that run 16-bit programs. In

addition, TeleVideo's multi-CPU architecture allows a mix of both its 16-bit and 8-bit computers to operate simultaneously in its shared-use system.

TS 8000 SYSTEM ENVIRONMENT

FEATURE: The TS 8000 series of fully integrated, stand alone computers are compatible with TeleVideo's 8-bit TS 806 and TS 816 systems' service processors. Up to six users are supported on the TS 806 and up to 16 on the TS 816 systems.



THE TS 8000 SERIES STORAGE CAPACITY

TS 8000 — Computer Workstation with 256K RAM.
TS 8002 — Stand alone computer and workstation with 256K RAM, one megabyte of unformatted on-line storage through integrated dual floppy disks.
TS 8002H — Single floppy with 0.5 megabyte and one Winchester 5¼ inch disk for 9.6 megabyte of unformatted memory.

GRAPHICS CAPABILITIES



The TS 8000 series provides excellent quality, high resolution graphics capabilities suitable for most business applications. Complex data can be displayed as clear charts, graphs, diagrams, line drawings, and other visual effects. In addition, TeleVideo is introducing the TS 802G and TS 802GH, 8-bit stand alone computers which also can function as satellite stations in a shared system, with graphics capabilities.

TS 8000 SERIES FEATURES:

CP/M 86 operating system is built-in
Intel 8088 16-bit chip
5 MHz CPU processing speed

RESULTS: The fast processing speed and great memory capacity of TeleVideo's 16-bit microcomputers support the very large base of the more powerful and versatile 16-bit software. Programs originally written for minicomputers and smaller mainframes can be adapted to run on the 8000 series.

This means minicomputer performance at TeleVideo's microcomputer price.

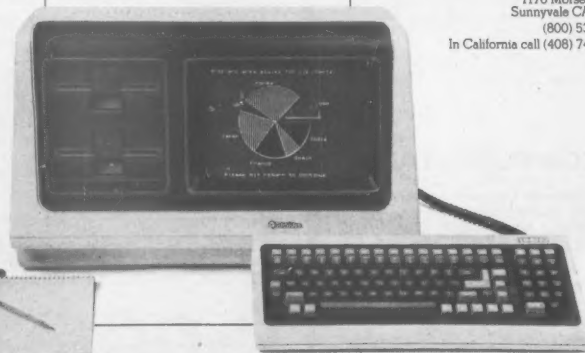
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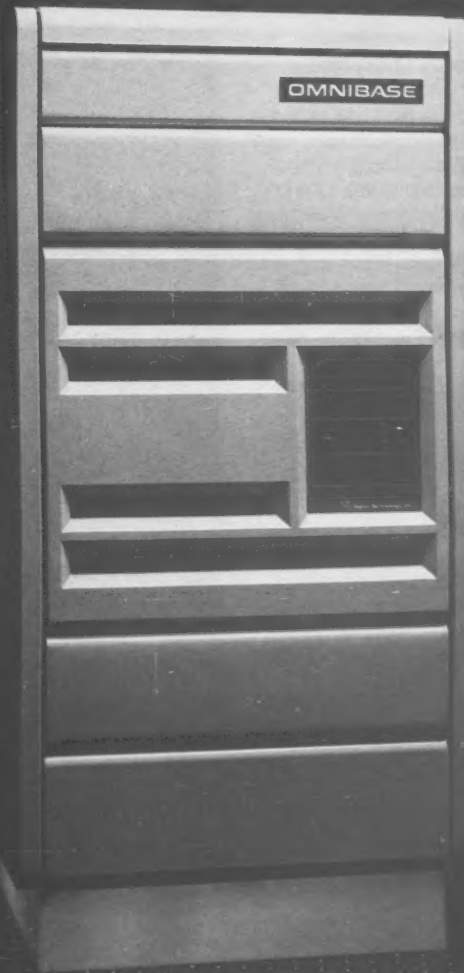
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DENMARK

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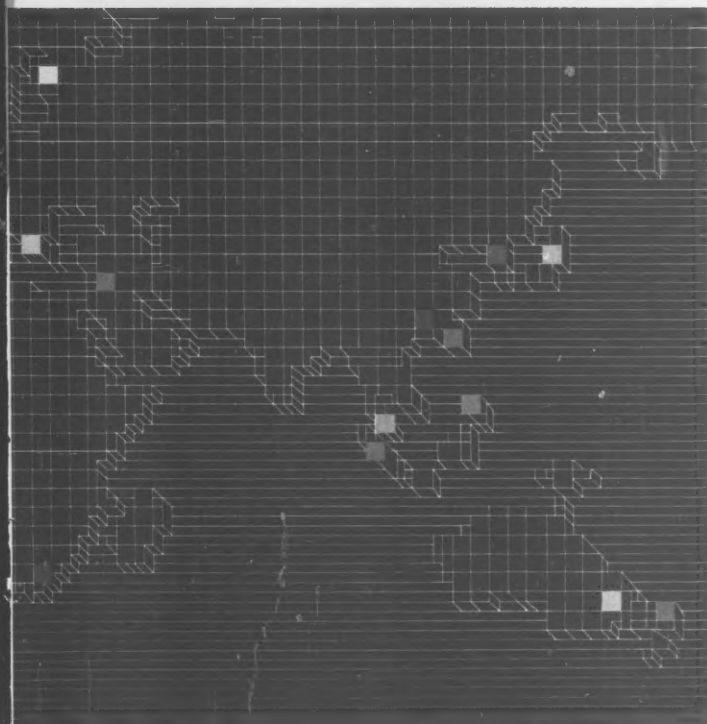
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(Continued from Page 50)

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June 28-29, Denver — **Data Communications: Advanced Concepts and Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 28-30, Chicago — **Strategies for Software Development.** Contact: Anthony Formica, Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

June 28-30, New York — **Video Text.** Contact: Meeting Systems, Inc., Suite 809, 286 5th Ave., New York, N.Y. 10001.

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June 28-30, New York — **Teleprocessing Software: An Introduction to Concepts, Systems and Applications.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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June 28-30, San Francisco — **Structured Systems: Analysis, Design and Programming.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 28-30, San Francisco — **Structured Testing: Tools and Techniques.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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and Applications. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 28-30, Chicago — **Data Communications: An Introduction to Concepts and Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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tems Analysis and Design: Concepts and Effective Practice. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 28-30, Washington, D.C. — **Telecommunications Management: Cost Reduction Techniques.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Del-

ran, N.J. 08075.

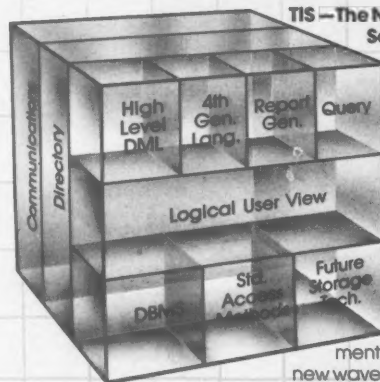
June 28-30, Philadelphia — **Network Communication Protocols.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earham, Orange, Calif. 92669.

June 28-30, Chicago — **Data Communications Systems.** Contact: Center for Advanced Professional Education, Inc., 11928 N. Earham, Orange, Calif. 92669.

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June 28-30, New York — **Job Control Language.** Contact: Chubb Advanced Training Center, 480 Morris Ave., Summit, N.J. 07901.

June 28-30, Los Angeles — **System Network Architecture.** Contact: Communication Solutions, Inc., Suite 205, 10062 Miller Ave., Cupertino, Calif. 95014.

June 28-30, Cary, N.C. — **SAS Exploratory Multivariate Course.** Contact: SAS Institute, Inc., P.O. Box 8000, Cary N.C. 27511.

June 28-30, Chicago — **International Computer Privacy, Security Conference.** Contact: Creel Associates, Inc., 900 Joric Blvd., Oak Brook, Ill. 60521.

June 28-30, Kansas City, Mo. — **The 1982 National Educational Computing**

Calendar

Conference. Contact: E. Michael Stanman, Campus Computing Services, University of Missouri-Columbia, Columbia, Mo. 65211.

June 28-30, New York — **Information Resources Management.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

June 28-July 2, New York — **Basic Assembler Lan-**

guage. Contact: Ellen Garfield, Software Education Corp., 1114 Ave. of the Americas, 37th Floor, New York, N.Y. 10036.

June 29-July 1, Washington, D.C. — **Covering Information Systems.** Contact: National Institute for Management Research, P.O. Box 3727, Santa Monica, Calif. 90403.

June 29-July 2, Boston — **Computer Graphics. Con-**

tact: Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

July 1-2, Chicago — **Hospital Financial Information Systems: Current Status & Future Requirements.** Contact: W.V. Rosqvist, Hospital Information Systems Sharing Group, 2415 S. 2300 West, Salt Lake City, Utah 84119.

July 6-9, Washington, D.C. — **Increasing Software Productivity Tools and Techniques.** Contact: Director, Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

July 7-9, Philadelphia — **Financial Analysis Workshop for Data Processing Professionals.** Contact: Q.E.D. Information Sciences, Inc., P.O. Box 181, Q.E.D. Plaza, Wellesley, Mass. 02181.

July 7-9, New York — **Data Base Management Systems: A Comparative Analysis of General-Purpose Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 7-9, San Francisco — **Distributed Systems: Effective Approaches and Application.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 7-9, San Francisco — **Basic: An Introduction to Computer Programming for Managers.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 7-9, Chicago — **Computer Software Packages: Evaluation and Selection.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 7-9, Chicago — **Integration of Word Processing and DP Systems.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

July 8-9, New York — **IBM's Systems Network Architecture: A Master Plan from Teleprocessing.** Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

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IPL, Singer Mainframes Top Datapro Survey

(Continued from Page 1)
survey.

Two of the more significant questions asked in the survey were "Did the system do what you expected it to do?" and "Would you recommend it

to another user?" The majority of the users polled claimed their systems did meet all of their expectations; however, a small percentage were not as complimentary.

For example, while Burroughs

B5900 and B6900 computer users had nothing but praise for their systems — giving those computer some of the highest scores for overall satisfaction, operating ease and reliability — B6700 and B7700 users had a ready

supply of darts. Nearly a third of those users reported that their systems did not perform as expected, and exactly half said they would not recommend their systems to other users.

Nearly 17% of the 84 Honeywell Level 62 users questioned in the survey admitted their systems did not perform as promised and almost 53% would not recommend that computer to other users, the survey showed.

A Number of Inconsistencies

The Datapro survey also turned up a number of inconsistencies. For instance, all of the NCR Corp. Model 8500 users in the study admitted their systems met or exceeded all prior expectations, but almost 40% would not go so far as to recommend that system to other buyers. The same situation occurred with users of Singer System 10 and Univac 90/30, 90/40, 90/60, 90/70 and 90/80 computers.

In both cases, all of the users reported satisfaction, but a significant number did not want other users to share in their apparent happiness.

The majority of the users polled had no plans to switch computers in 1982. However, a number do want to migrate from one machine to a presumably more powerful model.

Nearly half of the 313 IBM 370 series users expressed interest in changing mainframes. A very small percentage wanted to go the whole route and switch vendors as well as systems, the survey found. About 33% of the 108 IBM 3031 and 3032 users polled want to swap their systems for other systems from the same vendor.

As in past surveys, two of the more resilient systems — and the systems with the largest numbers of users — were IBM's 4331 and 4341 computers. Nearly all of the 344 Model 4331 users and the 441 Model 4341 users polled revealed no plans to jump from one mainframe to another.

Cross Section of CW Readers Polled

DELRAN, N.J. — The results of Datapro Research Corp.'s 1982 user survey of computer systems are based on returns from a mailing of 15,033 questionnaires sent to a cross section of *Computerworld* readers. Users were asked to rate their mainframes, minicomputers and small business systems in 14

categories.

Datapro received 5,330 completed questionnaires from 5,029 respondents, representing a 35% response rate. Of those, Datapro judged 246 responses invalid, giving a total of 5,094 valid responses from 4,783 users with a total of 6,147 installed mainframes, mini-

computers and small business systems.

Complete details of the user computer survey are compiled in a 39-page report, "1982 User Ratings of Computer Systems," available for \$25 a copy from Datapro, 1805 Underwood Ave., Delran, N.J. 08075.

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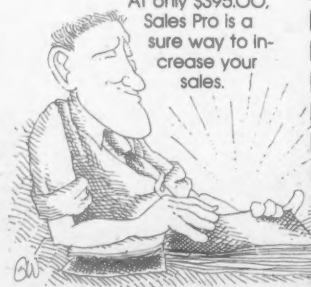
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|---|--|------------------|--------|-----------------------------------|-------|-----------------------------------|-------|------------------|--------|---------------------------|--------|---------------------------|--------|---------------------------|--------|-------------------------|--|
| Survey Item | | | | | | | | | | | | | | | | | |
| No. of Responses | | 45 | 18 | 71 | 20 | 25 | 71 | 20 | 25 | 10 | 25 | 71 | 20 | 25 | 71 | 6 | |
| No. of Systems Represented | | 56 | 21 | 29 | 68 | 81 | 29 | 81 | 25 | 15 | 40 | 75 | 40 | 75 | 40 | 9 | |
| Avg. Life of System (Mos.) | | 20.5 | 68.8 | | | | | | | 72.6 | 28.3 | | | | 33.7 | 33.0 | |
| Acquisition Method (%) | | | | | | | | | | | | | | | | | |
| Purchase | | 66.67 | 63.33 | 52.11 | 45.00 | 80.00 | 60.00 | 42.86 | 60.00 | 60.00 | 32.00 | 42.86 | 50.00 | 33.33 | 57.14 | 33.00 | |
| Rental or Lease from Mfr. | | 11.11 | 11.11 | 45.00 | 5.00 | 20.00 | 20.00 | 8.00 | 20.00 | 20.00 | 32.00 | 57.14 | 16.67 | 16.67 | 16.67 | 16.67 | |
| Lease from 3rd Party | | 22.22 | 5.56 | 2.82 | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | | |
| Principal Applications (%) | | | | | | | | | | | | | | | | | |
| Accounting/Billing | | 75.56 | 33.33 | 54.93 | 70.00 | 60.00 | 70.00 | 70.00 | 60.00 | 60.00 | 92.00 | 71.43 | 33.33 | 33.33 | 71.43 | 33.33 | |
| Banking—check processing/loans/savings | | 13.33 | 77.78 | 45.07 | 20.00 | 20.00 | 45.07 | 20.00 | 20.00 | 20.00 | 16.00 | 28.57 | 16.67 | 16.67 | 28.57 | 16.67 | |
| Construction/Architecture | | 6.67 | 0.00 | 5.63 | 0.00 | 0.00 | 5.63 | 0.00 | 0.00 | 0.00 | 12.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Education—scheduling/administration | | 33.33 | 0.00 | 1.41 | 10.00 | 10.00 | 1.41 | 10.00 | 10.00 | 10.00 | 16.00 | 0.00 | 66.67 | 0.00 | 66.67 | 0.00 | |
| Engineering/Scientific | | 15.56 | 11.11 | 11.27 | 15.00 | 20.00 | 8.00 | 15.00 | 20.00 | 20.00 | 8.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Healthcare/Medical | | 20.00 | 0.00 | 7.04 | 15.00 | 0.00 | 7.04 | 15.00 | 0.00 | 0.00 | 20.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Manufacturing | | 15.56 | 0.00 | 15.49 | 20.00 | 0.00 | 15.49 | 20.00 | 0.00 | 0.00 | 20.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Mathematics/Statistics | | 26.67 | 0.00 | 2.82 | 10.00 | 0.00 | 2.82 | 10.00 | 0.00 | 0.00 | 20.00 | 48.00 | 16.67 | 16.67 | 48.00 | 16.67 | |
| Order Processing/Inventory Control | | 46.67 | 11.11 | 54.93 | 65.00 | 60.00 | 54.93 | 65.00 | 60.00 | 60.00 | 48.00 | 85.71 | 33.33 | 33.33 | 85.71 | 33.33 | |
| Payroll/Personnel | | 4.44 | 0.00 | 2.82 | 0.00 | 0.00 | 2.82 | 0.00 | 0.00 | 0.00 | 0.00 | 14.29 | 0.00 | 0.00 | 14.29 | 0.00 | |
| Petroleum/Fuel Analysis | | 4.44 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | |
| Production Control | | 33.33 | 5.56 | 22.54 | 30.00 | 10.00 | 22.54 | 30.00 | 10.00 | 10.00 | 48.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Purchasing | | 24.44 | 0.00 | 21.13 | 20.00 | 20.00 | 21.13 | 20.00 | 20.00 | 10.00 | 28.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Sales Distribution | | 24.44 | 11.11 | 15.49 | 30.00 | 20.00 | 15.49 | 30.00 | 20.00 | 20.00 | 36.00 | 16.67 | 16.67 | 16.67 | 16.67 | 16.67 | |
| Other | | | | | | | | | | | | | | | | | |
| Source of Applications Programs (%) | | | | | | | | | | | | | | | | | |
| In-house personnel | | 100.00 | 94.44 | 92.96 | 85.00 | 100.00 | 92.96 | 85.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | |
| Contract programming from manufacturer | | 53.33 | 66.67 | 47.89 | 55.00 | 40.00 | 47.89 | 55.00 | 40.00 | 40.00 | 56.00 | 57.14 | 66.67 | 57.14 | 66.67 | 66.67 | |
| Contract programming | | 40.00 | 38.89 | 23.94 | 25.00 | 40.00 | 23.94 | 25.00 | 40.00 | 36.00 | 36.00 | 0.00 | 33.33 | 0.00 | 33.33 | 33.33 | |
| Manufacturer's Personnel | | 4.44 | 0.00 | 1.41 | 0.00 | 0.00 | 1.41 | 0.00 | 0.00 | 10.00 | 4.00 | 14.29 | 0.00 | 0.00 | 14.29 | 0.00 | |
| Proprietary Software Packages | | 60.00 | 38.89 | 38.03 | 50.00 | 40.00 | 38.03 | 50.00 | 40.00 | 40.00 | 36.00 | 14.29 | 16.67 | 16.67 | 16.67 | 16.67 | |
| Location of Computer (%) | | | | | | | | | | | | | | | | | |
| Distributed Processing Site | | 0.00 | 5.56 | 1.41 | 5.00 | 0.00 | 1.41 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Central Processing Installation | | 100.00 | 94.44 | 98.59 | 95.00 | 100.00 | 98.59 | 95.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | |
| Using Local Workstations/Terminals (%) | | | | | | | | | | | | | | | | | |
| Using Remote Workstations/Terminals (%) | | 95.56 | 88.24 | 83.10 | 90.00 | 100.00 | 83.10 | 90.00 | 100.00 | 100.00 | 95.83 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | |
| Using Data Base Management System (%) | | 75.56 | 16.67 | 36.62 | 40.00 | 90.00 | 36.62 | 40.00 | 90.00 | 92.00 | 86.71 | 66.67 | 66.67 | 66.67 | 66.67 | 66.67 | |
| Manufacturer's Package | | 24.44 | 83.33 | 63.98 | 60.00 | 10.00 | 63.98 | 60.00 | 10.00 | 10.00 | 8.00 | 14.29 | 33.33 | 33.33 | 14.29 | 33.33 | |
| Outside Vendor's Package | | 23.53 | 100.00 | 64.00 | 87.50 | 50.00 | 64.00 | 87.50 | 50.00 | 88.89 | 95.66 | 83.33 | 25.00 | 83.33 | 25.00 | 83.33 | |
| Home-Grown System | | 6.68 | 0.00 | 16.00 | 12.50 | 0.00 | 16.00 | 12.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Using Communications Monitor (%) | | 95.56 | 55.56 | 31.13 | 85.00 | 60.00 | 31.13 | 85.00 | 60.00 | 72.00 | 57.14 | 83.33 | 60.00 | 83.33 | 57.14 | 60.00 | |
| Manufacturer's Package | | 4.44 | 44.44 | 15.89 | 15.00 | 40.00 | 15.89 | 15.00 | 40.00 | 28.00 | 42.86 | 16.67 | 16.67 | 16.67 | 42.86 | 16.67 | |
| Outside Vendor's Package | | 41.86 | 70.00 | 86.86 | 88.24 | 66.67 | 86.86 | 88.24 | 66.67 | 72.22 | 50.00 | 60.00 | 60.00 | 60.00 | 50.00 | 60.00 | |
| Home-Grown System | | 55.81 | 30.00 | 4.35 | 11.76 | 0.00 | 4.35 | 11.76 | 0.00 | 11.11 | 11.11 | 0.00 | 0.00 | 0.00 | 11.11 | 0.00 | |
| Using Integrated Word Processing Functions (%) | | 37.78 | 0.00 | 5.63 | 15.00 | 0.00 | 5.63 | 15.00 | 0.00 | 0.00 | 24.00 | 28.57 | 16.67 | 16.67 | 28.57 | 16.67 | |
| Planned Acquisitions/Implementations for 1982 (%) | | | | | | | | | | | | | | | | | |
| Proprietary Software from the Manufacturer | | 51.11 | 22.22 | 16.90 | 35.00 | 20.00 | 16.90 | 35.00 | 20.00 | 20.00 | 44.00 | 28.57 | 0.00 | 0.00 | 28.57 | 0.00 | |
| Proprietary Software from other suppliers | | 84.44 | 22.22 | 33.80 | 35.00 | 30.00 | 33.80 | 35.00 | 30.00 | 40.00 | 40.00 | 28.57 | 33.33 | 33.33 | 28.57 | 33.33 | |
| Expansions to Data Communications facilities | | 90.00 | 33.33 | 52.11 | 40.00 | 60.00 | 52.11 | 40.00 | 60.00 | 60.00 | 40.00 | 42.86 | 16.67 | 16.67 | 42.86 | 16.67 | |
| Distributed Processing capabilities | | 75.99 | 0.00 | 12.69 | 20.00 | 20.00 | 12.69 | 20.00 | 20.00 | 40.00 | 60.00 | 42.86 | 16.67 | 16.67 | 42.86 | 16.67 | |
| Expansions to present hardware | | 44.44 | 38.89 | 3.89 | 35.00 | 10.00 | 3.89 | 35.00 | 10.00 | 40.00 | 40.00 | 42.86 | 16.67 | 16.67 | 42.86 | 16.67 | |
| Another Computer System, same model | | 13.33 | 11.11 | 8.45 | 15.00 | 0.00 | 8.45 | 15.00 | 0.00 | 0.00 | 8.00 | 28.57 | 33.33 | 33.33 | 28.57 | 33.33 | |
| Business graphics | | 35.56 | 0.00 | 7.04 | | | 7.04 | | | | | | | | | | |
| Plans for system replacement in 1982 (%) | | | | | | | | | | | | | | | | | |
| Yes, same manufacturer | | 11.11 | 50.00 | 12.68 | 5.00 | 20.00 | 12.68 | 5.00 | 20.00 | 10.00 | 12.00 | 0.00 | 0.00 | 0.00 | 0.00 | 16.67 | |
| Yes, different vendor | | 5.56 | 11.11 | 8.45 | 0.00 | 0.00 | 8.45 | 0.00 | 0.00 | 10.00 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| No | | 82.22 | 38.89 | 76.06 | 95.00 | 70.00 | 76.06 | 95.00 | 70.00 | 70.00 | 84.00 | 100.00 | 100.00 | 100.00 | 100.00 | 83.33 | |

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| Manufacturer and Model | | Survey Item | | | | | | | | Manufacturer and Model | | | | | | | |
|------------------------|---|----------------------|-------------------|-------------------|-----------------------|--------|----------------|----------------------|----------------------|------------------------|-------------------|-------------------|-----------------------|-------|----------------|--|---|
| Digital Equipment 10 | Digital Equipment 20 | Honywell 2000 Series | Honywell Level 62 | Honywell Level 64 | Honywell Level 66/DPS | DPS 8 | IBM System/360 | Digital Equipment 10 | Digital Equipment 20 | Honywell 2000 Series | Honywell Level 62 | Honywell Level 64 | Honywell Level 66/DPS | DPS 8 | IBM System/360 | Survey Item | |
| Digital Equipment 10 | No. of User Responses | 10 | 23 | 14 | 84 | 34 | 17 | 11 | 52.17 | 28.57 | 28.57 | 64.71 | 68.42 | 58.82 | 18.18 | Significant Advantages (%) | |
| | No. of Systems Represented | 5 | 12 | 14 | 87 | 34 | 19 | 11 | 70.00 | 7.14 | 7.14 | 76.47 | 71.05 | 82.35 | 9.09 | Users are happy with response time | |
| | Avg. Life of System (Years) | 5.7 | 39.6 | 98.0 | 48.8 | 40.4 | 16.5 | 49.7 | 0.00 | 7.14 | 7.14 | 14.71 | 10.53 | 5.88 | 9.09 | System is easy to expand/reconfigure | |
| | Success | 90.00 | 73.91 | 71.43 | 23.76 | 61.76 | 41.18 | 72.73 | 30.43 | 28.57 | 28.57 | 58.82 | 21.05 | 58.82 | 45.45 | Programs/data carried over from other systems | |
| | Rental or Lease from Mfr. | 10.00 | 8.70 | 0.00 | 69.05 | 37.26 | 47.06 | 0.00 | 39.13 | 0.00 | 0.00 | 4.76 | 18.42 | 47.06 | 9.09 | Systems are compatible, are vendor promised | |
| | Lease from 3rd Party | 0.00 | 17.39 | 28.57 | 1.19 | 2.84 | 11.76 | 27.27 | 0.00 | 14.29 | 14.29 | 8.33 | 23.53 | 47.06 | 0.00 | Programs/data carried over from other systems | |
| | Principal Applications (%) | | | | | | | | | | | | | | | Systems are more powerful than other systems | |
| | Banking—back processing/loans/savings | 0.00 | 52.17 | 82.86 | 94.05 | 94.12 | 78.22 | 92.35 | 100.00 | 13.04 | 14.29 | 8.33 | 13.16 | 13.16 | 41.18 | 0.00 | System is power/energy efficient |
| | Construction—Architecture | 0.00 | 8.70 | 7.14 | 2.38 | 8.62 | 17.65 | 9.09 | 0.00 | 47.83 | 14.29 | 14.29 | 31.58 | 31.58 | 41.18 | 0.00 | Productivity aids help us keep programming costs down |
| | Education—scheduling/administration | 80.00 | 4.35 | 0.00 | 2.38 | 2.63 | 11.76 | 0.00 | 0.00 | 17.39 | 7.14 | 1.19 | 5.68 | 5.26 | 23.53 | 0.00 | Data base language is efficient and effective |
| Digital Equipment 20 | Engineering/Scientific | 0.00 | 28.57 | 7.14 | 5.95 | 5.68 | 5.88 | 0.00 | 30.43 | 14.29 | 8.33 | 26.47 | 5.26 | 23.53 | 0.00 | Cost of maintenance of equipment was ahead of schedule | |
| | Health care/Medical | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.76 | 0.00 | 8.70 | 14.29 | 4.76 | 8.82 | 2.63 | 5.88 | 0.00 | Delivery of required software was ahead of schedule | |
| | Manufacturing | 10.00 | 8.70 | 21.43 | 0.00 | 23.53 | 5.26 | 25.88 | 10.00 | 0.00 | 14.29 | 8.82 | 2.63 | 5.88 | 0.00 | Significant Problems (%) | |
| | Mathematics/Statistics | 0.00 | 4.35 | 28.57 | 35.71 | 35.68 | 18.42 | 17.65 | 13.04 | 7.14 | 30.95 | 8.82 | 13.16 | 5.88 | 0.00 | Computer proposed by vendor was too small | |
| | Order Processing/Inventory Control | 10.00 | 34.78 | 28.57 | 75.00 | 67.65 | 57.69 | 52.94 | 0.00 | 0.00 | 16.67 | 11.76 | 18.42 | 17.65 | 0.00 | Delivery of required equipment was late | |
| | Payroll/Personnel | 10.00 | 13.04 | 85.71 | 67.66 | 76.47 | 65.79 | 41.18 | 4.35 | 14.29 | 13.10 | 17.65 | 18.42 | 17.65 | 0.00 | Delivery of required software was late | |
| | Petroleum/Fuel analysis | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 11.76 | 4.35 | 21.43 | 19.05 | 11.76 | 23.68 | 23.53 | 0.00 | System costs for hardware, vendor-supplied software, support exceeded the expected total | |
| | Process Control | 10.00 | 0.00 | 7.14 | 3.57 | 2.94 | 0.00 | 0.00 | 17.39 | 21.43 | 39.29 | 11.76 | 23.68 | 11.76 | 0.00 | Vendor did not provide all the promised software or support | |
| | Process Control | 20.00 | 17.39 | 35.71 | 39.00 | 45.16 | 39.29 | 29.41 | 0.00 | 0.00 | 11.90 | 2.94 | 13.16 | 0.00 | 0.00 | Vendor promised data compatibility not what vendor promised | |
| | Sales Distribution | 0.00 | 13.04 | 21.43 | 13.10 | 17.65 | 28.95 | 29.41 | 45.45 | 4.35 | 0.00 | 9.52 | 0.00 | 11.76 | 0.00 | Vendor promised data compatibility not what vendor promised | |
| Digital Equipment 20 | Other | 50.00 | 26.08 | 21.43 | 13.10 | 17.65 | 29.41 | 27.27 | 4.35 | 0.00 | 9.52 | 0.00 | 11.76 | 0.00 | 0.00 | Vendor promised data compatibility not what vendor promised | |
| | Source of Applications Programs (%) | | | | | | | | | | | | | | | Vendor promised data compatibility not what vendor promised | |
| | Household Appliances from manufacturer | 100.00 | 91.30 | 100.00 | 91.67 | 97.06 | 97.37 | 100.00 | 20.00 | 7.14 | 16.67 | 5.88 | 44.74 | 23.53 | 0.00 | Vendor promised data compatibility not what vendor promised | |
| | Business Programs from manufacturer | 30.00 | 30.43 | 35.71 | 42.86 | 23.53 | 42.11 | 39.29 | 10.00 | 21.43 | 13.10 | 8.82 | 7.69 | 0.00 | 9.09 | Vendor promised data compatibility not what vendor promised | |
| | Contract Programming | 40.00 | 26.09 | 7.14 | 35.65 | 5.68 | 18.42 | 29.41 | 13.04 | 28.57 | 16.67 | 0.00 | 13.16 | 0.00 | 21.27 | Equipment is excessively noisy | |
| | Manufacturer's Personnel | 0.00 | 17.39 | 14.29 | 16.67 | 14.71 | 34.21 | 41.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Power and/or cooling requirements are excessive | |
| | Proprietary Software Packages | 50.00 | 47.83 | 7.14 | 16.67 | 14.71 | 34.21 | 41.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | System Ratings (4.0-1.0) | |
| | Location of Computer (%) | | | | | | | | | | | | | | | Ease of operation | |
| | Inside Vendor's Plant | 0.00 | 8.70 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.57 | 3.23 | 2.95 | 3.34 | 3.45 | 3.31 | 2.82 | Reliability of Mainframe | |
| | Central Processing Installation | 100.00 | 91.30 | 100.00 | 91.67 | 97.06 | 97.37 | 100.00 | 2.90 | 3.08 | 3.18 | 3.53 | 3.05 | 3.47 | 2.55 | Reliability of Peripherals | |
| IBM System/360 | Using Local Workstations/Terminals (%) | | | | | | | | | | | | | | | Maintenance service | |
| | Using Remote Workstations/Terminals (%) | 90.00 | 86.36 | 15.38 | 33.33 | 58.82 | 94.74 | 100.00 | 3.39 | 3.14 | 3.01 | 3.47 | 3.16 | 3.41 | 2.64 | Business effectiveness | |
| | Using Data Base Management System (%) | 90.00 | 86.36 | 15.38 | 33.33 | 58.82 | 94.74 | 100.00 | 2.90 | 2.64 | 2.78 | 3.41 | 2.71 | 3.18 | 2.70 | Technical support | |
| | Using Data Base Management System (%) | 50.00 | 52.17 | 14.29 | 7.14 | 78.65 | 94.74 | 100.00 | 2.40 | 2.29 | 2.45 | 3.06 | 2.55 | 2.88 | 2.27 | Trouble-shooting | |
| | Manufacturer's Package | 50.00 | 47.83 | 85.71 | 80.00 | 80.00 | 86.67 | 86.67 | 2.60 | 2.64 | 2.18 | 2.76 | 2.45 | 2.81 | 2.27 | Education | |
| | Outside Vendor's Package | 50.00 | 47.83 | 85.71 | 80.00 | 80.00 | 86.67 | 86.67 | 2.30 | 2.45 | 2.02 | 2.62 | 2.31 | 2.73 | 2.18 | Documentation | |
| | Home-Grown System | 0.00 | 8.33 | 100.00 | 40.00 | 20.00 | 6.67 | 13.33 | 3.40 | 3.08 | 3.10 | 3.47 | 3.16 | 3.41 | 2.64 | Manufacturer's software: | |
| | Using Communications Monitor (%) | 40.00 | 56.52 | 23.08 | 61.90 | 67.65 | 94.74 | 84.12 | 3.35 | 2.77 | 2.80 | 3.53 | 3.46 | 3.50 | 2.50 | Operating system | |
| | Manufacturer's Package | 60.00 | 43.48 | 75.00 | 75.00 | 100.00 | 84.38 | 93.75 | 3.10 | 3.04 | 2.85 | 3.13 | 3.11 | 3.13 | 2.64 | Compilers & Assemblers | |
| | Outside Vendor's Package | 100.00 | 43.48 | 75.00 | 75.00 | 100.00 | 84.38 | 93.75 | 2.43 | 2.71 | 2.50 | 2.40 | 2.48 | 2.38 | 2.67 | Applications Programs | |
| IBM System/360 | Home-Grown System | 0.00 | 7.69 | 33.33 | 1.92 | 0.00 | 6.25 | 6.25 | 3.15 | 2.67 | 2.36 | 3.19 | 2.51 | 2.79 | 2.73 | Ease of Programming | |
| | Using Integrated Word Processing Functions (%) | | | | | | | | | | | | | | | Ease of communication | |
| | Planned Applications/Implementations for 1982 (%) | | | | | | | | | | | | | | | Overall satisfaction | |
| | Additional Software from the Manufacturer | 30.00 | 26.09 | 7.14 | 15.48 | 35.29 | 42.11 | 41.18 | 92.61 | 78.57 | 75.90 | 91.18 | 84.21 | 88.24 | 85.91 | Did the system do what you expected it to do? (%) | |
| | Proprietary Software from other suppliers | 40.00 | 43.48 | 7.14 | 26.19 | 11.76 | 39.47 | 47.06 | 1.00 | 1.00 | 1.00 | 5.68 | 1.00 | 1.00 | 0.00 | Yes | |
| | Dependent Processing capabilities | 40.00 | 47.83 | 7.14 | 35.71 | 64.71 | 55.26 | 64.71 | 4.35 | 0.00 | 7.23 | 5.68 | 5.26 | 11.76 | 9.09 | Have you decided | |
| | Expansions to present hardware | 20.00 | 21.74 | 7.14 | 11.90 | 23.53 | 26.32 | 41.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Would you recommend system to another user? (%) | |
| | Expansions to present hardware | 50.00 | 69.57 | 7.14 | 34.52 | 5.68 | 0.00 | 0.00 | 81.82 | 14.29 | 32.14 | 88.24 | 78.95 | 76.47 | 36.36 | Yes | |
| | Another Computer System, same model | 10.00 | 21.74 | 0.00 | 0.00 | 2.84 | 0.00 | 17.65 | 10.00 | 9.09 | 52.38 | 85.71 | 13.16 | 5.88 | 54.55 | No | |
| | Business graphics | 10.00 | 26.08 | 0.00 | 0.00 | 0.00 | 10.53 | 0.00 | 10.00 | 9.09 | 15.48 | 8.82 | 7.69 | 17.65 | 9.09 | Have you decided | |
| IBM System/360 | Plans for system replacement in 1982 (%) | | | | | | | | | | | | | | | Plans for system replacement in 1982 (%) | |
| | Yes, vendor unknown | 20.00 | 8.70 | 14.29 | 4.76 | 11.76 | 2.63 | 5.88 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Yes, vendor unknown | |
| | Yes, vendor known | 4.35 | 21.43 | 10.71 | 2.84 | 5.26 | 5.26 | 94.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Yes, vendor known | |
| | Yes, different vendor | 4.35 | 21.43 | 64.29 | 82.35 | 92.11 | 94.12 | 94.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Yes, different vendor | |
| | Other | 70.00 | 82.61 | 42.86 | 82.35 | 92.11 | 94.12 | 94.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | Other | |

In Datapro Survey

Users Find Software, Support Problem Areas

By Tim Scannell
CW Staff

DELRAN, N.J. — Users in every system category covered by Datapro Research Corp. in its recent survey on processors reported some type of problem or dissatisfaction, but software and support appear to be areas of particular concern.

Users of systems from Honeywell, Inc., Burroughs Corp. and Sperry Univac had the most complaints about the vendor not supplying all the promised software and support. Almost 22% of the 187 Honeywell users, 18% of the 205 Burroughs users and 21% of the 197 Univac users in the survey said their vendors were lacking in software and support.

IBM users had problems with what was finally delivered. Nearly 20% of the Model 4331 users and more than 12% of the 4341 users surveyed reported difficulties with vendor software and support.

As in past Datapro surveys, technical support — an area that includes troubleshooting, education and documentation — received low marks from users across the systems board. Documentation and education seemed to generate the most lukewarm responses. On a scale of 1 to 4, with 4 the highest, most users assigned a rating that fell somewhere in the middle.

Burroughs and Honeywell users, perhaps shadowing the scores given to their systems, rated technical support lower than users of other systems, the survey noted.

Systems Cost

The ever-present bottom line — systems cost — was another question posed to the more than 2,000 users polled by Datapro. Most reported that overall systems costs were actually less than expected; very few complained that hardware, vendor-supplied software and support exceeded the expected total.

More IBM users cited inflated and unexpected costs than did their plug-compatible counterparts. Over 18% of the 344 IBM 4331 users paid more for their systems than they had expected to pay; in addition, nearly 20% of the more than 500 IBM 4341, 3031 and 3032 users reported they had to dig deeper into their acquisitions pockets than they thought they would.

By comparison, a little more than 2% of the 109 users of plug-compatible mainframes polled paid more for their computers than the vendors first promised, researchers noted. More than one-fourth of these users claimed their systems cost less than

initially expected, and 45% added that their systems were delivered and/or installed ahead of schedule.

Majority to Expand

As in previous surveys, most of the users polled planned to add new equipment or expand the capabilities of their systems. Like last year, data communications was the implementations front-runner. Exactly 80% of the Amdahl Corp. 470 series users and nearly half the 1,429 IBM systems users polled plan to expand their data communications facilities.

In rough figures, this means that more than 900 of these systems are slated for communications upgrades

sometime this year, the report noted.

Software is a second area the majority of those surveyed targeted for expansion sometime this year. As in past years, most users will opt for proprietary software from third-party suppliers rather than products from their systems vendors.

Fewer Systems Swaps

One notable statistic in the survey is the number of users planning to replace their mainframes this year. Fewer users are planning a systems swap this year than last year.

However, about 190 users of IBM's older 370, 3031 and 3032 hardware are penciling in plans for new acqui-

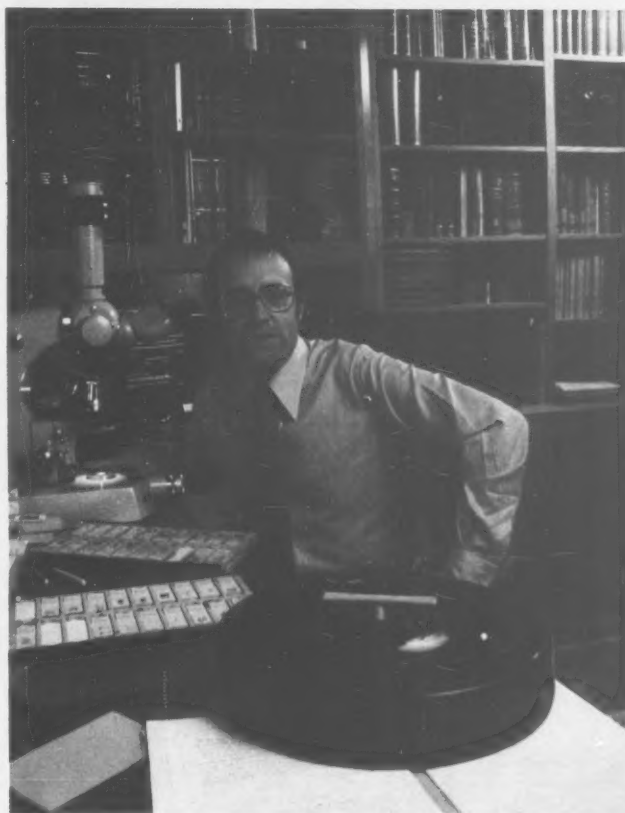
sitions. A small percentage of these users will choose a vendor other than IBM, the survey found.

Finally, as in last year's study, purchasing a system directly from the manufacturer seems to be the most popular method of getting a computer operation off the ground.

Renting or leasing from the vendor is the next popular method, with third-party leasing trailing as the last alternative, the survey showed.

Complete details of this survey are available in a 39-page report, "1982 User Ratings of Computer Systems," which can be ordered for \$25 from Datapro Research, 1805 Underwood Ave., Delran, N.J. 08075.

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... From Amdahl to Univac ...

| Survey Item | IBM System/370 | IBM 8100 | IBM 4331 Series | IBM 4341 Series | IBM 3031 & 3032 Series | IBM 3081 | IBM 4400 Series |
|---|----------------|----------|-----------------|-----------------|------------------------|----------|-----------------|
| No. of User Responses | 313 | 22 | 344 | 441 | 103 | 183 | 8 |
| No. of Systems Represented | 357 | 33 | 359 | 353 | 133 | 261 | 8 |
| Avg. Life of System (Mos.) | 41.3 | 14.4 | 16.9 | 11.1 | 28.4 | 19.3 | 6.9 |
| Acquisition Method (%) | | | | | | | |
| Purchase | 45.81 | 22.73 | 20.83 | 27.75 | 37.86 | 40.74 | 25.00 |
| Rental or Lease from Mfr. | 5.81 | 72.73 | 72.97 | 56.88 | 12.04 | 13.88 | 0.00 |
| Lease from 3rd Party | 48.39 | 4.55 | 6.10 | 15.37 | 50.00 | 45.68 | 0.00 |
| Principal Applications (%) | | | | | | | |
| Accounting/Billing | 78.91 | 50.00 | 81.40 | 77.32 | 81.48 | 73.62 | 62.50 |
| Banking-check processing/loans/savings | 0.96 | 0.00 | 7.85 | 12.96 | 12.96 | 26.77 | 0.00 |
| Construction/Architecture | 0.96 | 0.00 | 2.33 | 2.27 | 4.63 | 4.91 | 0.00 |
| Education/Research | 9.58 | 18.18 | 7.85 | 8.39 | 6.48 | 16.50 | 0.00 |
| Engineering/Scientific | 10.86 | 22.73 | 8.14 | 11.11 | 10.19 | 22.70 | 0.00 |
| Health care/Medical | 8.95 | 0.00 | 6.69 | 10.88 | 15.74 | 15.34 | 0.00 |
| Insurance | 13.10 | 4.55 | 34.01 | 31.07 | 25.63 | 20.86 | 37.50 |
| Manufacturing | 13.14 | 29.09 | 8.14 | 11.11 | 18.52 | 14.81 | 0.00 |
| Mathematics/Statistics | 53.67 | 40.91 | 53.20 | 49.89 | 55.55 | 48.15 | 37.50 |
| Order Processing/Inventory Control | 71.25 | 36.36 | 62.50 | 65.08 | 72.22 | 70.37 | 0.00 |
| Production Control | 3.88 | 4.55 | 1.74 | 2.04 | 5.56 | 5.52 | 0.00 |
| Process Control | 3.88 | 13.64 | 3.75 | 3.75 | 6.48 | 11.11 | 0.00 |
| Purchasing | 38.42 | 18.18 | 39.83 | 35.37 | 37.04 | 70.37 | 12.50 |
| Sales Distribution | 18.53 | 22.73 | 21.22 | 16.33 | 20.37 | 33.33 | 62.50 |
| Other | | | | | | | |
| Source of Applications Programs (%) | | | | | | | |
| In-house personnel | 98.61 | 95.45 | 92.15 | 94.33 | 97.22 | 96.32 | 100.00 |
| "Packaged" programs from manufacturer | 35.01 | 18.18 | 53.24 | 53.24 | 60.19 | 59.28 | 37.50 |
| Contract Programming | 3.88 | 22.73 | 26.74 | 35.50 | 48.15 | 48.15 | 0.00 |
| Manufacturer's Personnel | 52.40 | 9.09 | 2.03 | 4.31 | 10.19 | 11.11 | 0.00 |
| Proprietary Software Package | | | | | | | |
| Location of Computer (%) | | | | | | | |
| Distributed Processing Site | 1.60 | 90.91 | 5.22 | 1.26 | 2.78 | 3.70 | 0.00 |
| Central Processing Installation | 98.40 | 9.09 | 94.46 | 98.64 | 97.22 | 96.30 | 100.00 |
| Using Local Workstations/Terminals (%) | | | | | | | |
| Using Remote Workstations/Terminals (%) | | | | | | | |
| Using Data Base Management System (%) | | | | | | | |
| Manufacturer's Package | 48.24 | 54.55 | 54.55 | 57.37 | 67.69 | 96.30 | 12.50 |
| Outside Vendor's Package | 51.76 | 45.45 | 45.45 | 42.63 | 32.41 | 3.70 | 87.50 |
| Home-Grown System | 34.67 | 9.09 | 74.38 | 63.01 | 67.69 | 80.77 | 0.00 |
| Using Communications Monitor (%) | | | | | | | |
| Manufacturer's Package | 7.33 | 0.00 | 4.95 | 39.04 | 34.25 | 11.54 | 0.00 |
| Outside Vendor's Package | | | | | | | |
| Home-Grown System | | | | | | | |
| Using Communications Monitor (%) | | | | | | | |
| Manufacturer's Package | 81.09 | 71.43 | 75.00 | 88.68 | 94.44 | 92.64 | 75.00 |
| Outside Vendor's Package | 18.91 | 28.57 | 25.00 | 11.34 | 5.56 | 7.36 | 25.00 |
| Home-Grown System | 22.31 | 13.33 | 7.81 | 84.11 | 92.66 | 81.51 | 33.33 |
| Using Integrated Word Processing Functions (%) | | | | | | | |
| Planned Acquisitions/Implementations for 1982 (%) | | | | | | | |
| Additional Software from the Manufacturer | 41.53 | 22.73 | 41.28 | 55.78 | 63.68 | 65.03 | 0.00 |
| Proprietary Software from Communications facilities | 53.04 | 13.64 | 49.71 | 68.71 | 70.39 | 75.48 | 25.00 |
| Distributed Processing capabilities | 45.05 | 18.18 | 49.42 | 61.00 | 67.59 | 73.62 | 82.50 |
| Expanded to present hardware | 19.81 | 9.09 | 14.53 | 20.41 | 30.95 | 44.17 | 25.00 |
| Another Computer System, same model | 41.21 | 45.46 | 48.26 | 53.51 | 64.11 | 62.50 | 0.00 |
| Business graphics | 5.43 | 9.09 | 6.90 | 16.33 | 21.20 | 29.46 | 25.00 |
| Plans for system replacement in 1982 (%) | | | | | | | |
| Yes, same manufacturer | 40.89 | 13.64 | 13.08 | 3.40 | 32.41 | 15.34 | 12.50 |
| Yes, different vendor | 2.56 | 0.00 | 0.87 | 0.68 | 0.93 | 0.23 | 0.00 |
| No | 52.06 | 81.82 | 84.01 | 95.63 | 64.81 | 80.96 | 87.50 |

| Manufacturer and Model | IBM System/370 | IBM 8100 | IBM 4331 Series | IBM 4341 Series | IBM 3031 & 3032 Series | IBM 3081 | IBM 4400 Series |
|---|----------------|----------|-----------------|-----------------|------------------------|----------|-----------------|
| Significant Advantages (%) | | | | | | | |
| Users are happy with response time | 43.13 | 31.82 | 54.65 | 71.20 | 56.48 | 59.26 | 87.50 |
| System is easy to expand/reconfigure | 38.75 | 40.91 | 56.40 | 56.24 | 50.00 | 40.74 | 75.00 |
| System costs were less than expected | 12.78 | 4.55 | 14.28 | 16.10 | 7.41 | 14.81 | 25.00 |
| Programs/data carried over from other systems | 54.95 | 13.64 | 54.65 | 72.56 | 68.50 | 74.07 | 75.00 |
| Terminals/peripherals carried over from other systems | 44.73 | 27.27 | 35.17 | 66.31 | 66.67 | 74.07 | 50.00 |
| Systems are compatible, as vendor promised | 5.75 | 31.82 | 63.66 | 68.71 | 15.74 | 37.04 | 87.50 |
| System is power/energy efficient | 20.77 | 50.00 | 44.77 | 33.11 | 36.11 | 33.33 | 25.00 |
| Productivity aids help us keep programming costs down | 10.22 | 22.73 | 7.56 | 16.55 | 22.22 | 22.22 | 0.00 |
| Database language is efficient and effective | 8.95 | 18.18 | 15.70 | 19.95 | 22.22 | 22.22 | 0.00 |
| Delivery and/or installation of equipment was ahead of schedule | 5.43 | 4.55 | 9.88 | 9.22 | 12.04 | 22.22 | 0.00 |
| Significant Problems (%) | | | | | | | |
| Computer provided by vendor was too small | 0.64 | 22.73 | 10.17 | 1.38 | 3.70 | 3.70 | 12.50 |
| Vendor's software was too late | 0.64 | 5.09 | 3.78 | 7.26 | 4.63 | 2.45 | 0.00 |
| Delivery of required hardware, vendor supplied software, support) exceeded the expected total | 1.28 | 18.18 | 8.14 | 6.07 | 0.83 | 0.00 | 0.00 |
| Vendor did not provide all the promised software or support | 7.99 | 13.64 | 18.02 | 8.94 | 10.19 | 8.59 | 0.00 |
| Program/data compatibility not what vendor promised | 3.19 | 22.73 | 19.77 | 12.47 | 11.11 | 4.91 | 12.50 |
| Vendor's hardware compatibility not what | 0.32 | 9.09 | 4.07 | 3.49 | 2.78 | 0.61 | 0.00 |
| Vendor enhancements/changes to hardware/equipment is excessively noisy | 1.60 | 4.55 | 1.74 | 2.27 | 0.83 | 0.00 | 0.00 |
| Power and/or cooling requirements are excessive | 15.85 | 22.73 | 28.49 | 16.10 | 19.44 | 12.27 | 11.11 |
| System Ratings (4.0-1.0) | | | | | | | |
| Ease of operation | 3.03 | 3.00 | 3.12 | 3.35 | 3.16 | 3.25 | 3.68 |
| Reliability of Mainframe | 3.12 | 3.38 | 3.77 | 3.78 | 3.64 | 3.65 | 4.00 |
| Reliability of Peripherals | 3.13 | 3.32 | 3.30 | 3.28 | 3.34 | 3.23 | 2.57 |
| Maintenance service | 3.15 | 3.32 | 3.34 | 3.31 | 3.43 | 3.45 | 3.88 |
| Responsiveness | 3.06 | 3.18 | 3.21 | 3.22 | 3.36 | 3.32 | 3.75 |
| Efficiency | | | | | | | |
| Technical support | | | | | | | |
| Trouble-shooting | 2.77 | 2.77 | 2.77 | 2.85 | 2.94 | 3.04 | 3.63 |
| Education | 2.76 | 2.62 | 2.68 | 2.77 | 2.91 | 2.89 | 2.86 |
| Documentation | 2.66 | 2.91 | 2.60 | 2.71 | 2.74 | 2.97 | 2.88 |
| Manufacturer's software | | | | | | | |
| Compilers & Assemblers | 3.05 | 2.82 | 2.84 | 3.03 | 3.19 | 3.28 | 3.00 |
| Applications Programs | 3.17 | 2.63 | 2.84 | 3.15 | 2.76 | 2.82 | 3.00 |
| Ease of Programming | 2.76 | 2.63 | 2.84 | 2.82 | 2.76 | 2.82 | 3.00 |
| Ease of conversion | 2.89 | 2.90 | 2.94 | 2.99 | 2.97 | 2.95 | 3.50 |
| Overall satisfaction | 2.84 | 2.72 | 3.11 | 3.19 | 3.19 | 3.18 | 3.71 |
| Did the system do what you expected it to do? (%) | | | | | | | |
| Yes | 95.51 | 63.64 | 88.05 | 94.55 | 98.15 | 88.89 | 100.00 |
| No | 2.56 | 13.64 | 3.50 | 0.45 | 0.93 | 1.94 | 0.00 |
| Have'n't decided | 1.92 | 22.73 | 8.45 | 5.00 | 0.93 | 2.45 | 0.00 |
| Would you recommend system to another user? (%) | | | | | | | |
| Yes | 74.44 | 63.64 | 88.95 | 95.91 | 90.74 | 92.02 | 100.00 |
| No | 17.57 | 18.18 | 2.62 | 0.23 | 6.48 | 4.29 | 0.00 |
| Have'n't decided | 7.99 | 18.18 | 8.43 | 3.86 | 2.78 | 3.68 | 0.00 |

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Users Rate Their Mainframes . . .

| Survey Item | Magnum Series | NAS AS 3, AS 4, AS 5 & AS 6 | NAS AS 5000, 7000 & 9000 | NCR Century Series | NCR 8400 Series | NCR 8500 Series | Singer System 10 | Spartan Universe 90/30 & 90/40 |
|---|---------------|-----------------------------|--------------------------|--------------------|-----------------|-----------------|------------------|--------------------------------|
| No. of User Responses | 29 | 16 | 11 | 31 | 38 | 38 | 14 | 109 |
| No. of Systems Represented | 34 | 22 | 12 | 33 | 33 | 33 | 14 | 114 |
| Avg. Life of System (Mos.) | 12.3 | 34 | 18.3 | 73.5 | 24.1 | 27.6 | 72.7 | 47.6 |
| Acquisition Method (%) | | | | | | | | |
| Purchase | 34.48 | 43.75 | 72.73 | 60.00 | 40.91 | 34.09 | 76.00 | 34.86 |
| Lease from Mfr. | 58.62 | 18.75 | 9.09 | 16.67 | 38.36 | 40.91 | 0.00 | 61.47 |
| Lease from 3rd Party | 6.90 | 37.50 | 18.18 | 23.33 | 22.73 | 25.00 | 25.00 | 3.67 |
| Principal Applications (%) | | | | | | | | |
| Accounting/Billing | 62.07 | 68.75 | 54.55 | 74.19 | 68.18 | 64.77 | 62.50 | 88.07 |
| Banking—check processing/loans/savings | 24.14 | 6.25 | 0.00 | 22.58 | 28.41 | 34.09 | 0.00 | 5.50 |
| Construction—scheduling/administration | 0.00 | 6.25 | 0.00 | 0.00 | 2.27 | 0.00 | 0.00 | 1.83 |
| Engineering/Scientific | 3.45 | 12.50 | 0.00 | 12.90 | 4.55 | 7.96 | 0.00 | 5.50 |
| Health Care/Medical | 3.45 | 6.25 | 18.18 | 0.00 | 11.14 | 11.36 | 0.00 | 0.00 |
| Insurance | 6.90 | 0.00 | 0.00 | 12.90 | 11.36 | 11.36 | 0.00 | 5.50 |
| Manufacturing | 12.90 | 12.50 | 18.18 | 6.45 | 17.05 | 17.05 | 50.00 | 11.93 |
| Mathematics/Statistics | 12.90 | 12.50 | 36.36 | 32.33 | 3.41 | 2.27 | 12.50 | 27.52 |
| Material Management/Inventory Control | 3.45 | 12.50 | 45.45 | 45.16 | 45.45 | 38.64 | 75.00 | 63.90 |
| Payroll/Personnel | 20.68 | 68.75 | 45.45 | 70.97 | 68.32 | 59.09 | 62.50 | 88.97 |
| Petroleum/Fuel analysis | 0.00 | 0.00 | 0.00 | 0.00 | 2.27 | 4.55 | 0.00 | 0.00 |
| Process control | 0.00 | 0.00 | 0.00 | 0.00 | 18.18 | 23.86 | 25.00 | 3.67 |
| Purchasing | 20.68 | 25.00 | 18.18 | 22.58 | 18.18 | 23.86 | 75.00 | 55.05 |
| Sales Distribution | 12.90 | 18.18 | 9.09 | 32.26 | 20.45 | 29.55 | 12.50 | 22.94 |
| Other | 62.07 | 25.00 | 0.00 | 9.68 | 12.50 | 14.77 | 0.00 | 0.00 |
| Sources of Applications Programs (%) | | | | | | | | |
| In-house personnel | 32.10 | 33.75 | 90.91 | 90.32 | 77.27 | 88.36 | 62.50 | 98.17 |
| "Packaged" programs from manufacturer | 24.14 | 62.50 | 45.45 | 9.32 | 71.55 | 69.32 | 37.50 | 47.71 |
| Contract Programming | 20.68 | 37.50 | 9.09 | 19.35 | 28.41 | 23.86 | 75.00 | 33.94 |
| Manufacturer's Personnel | 20.68 | 6.25 | 0.00 | 9.68 | 6.82 | 9.09 | 12.50 | 20.18 |
| Proprietary Software Packages | 58.62 | 88.75 | 63.64 | 8.68 | 14.77 | 30.68 | 0.00 | 38.53 |
| Location of Computer (%) | | | | | | | | |
| Distributed Processing Site | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 |
| Central Processing Installation | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 99.98 |
| Using Local Workstations/Terminals (%) | | | | | | | | |
| Using Remote Workstations/Terminals (%) | | | | | | | | |
| Using Data Base Management System (%) | | | | | | | | |
| Name | 31.03 | 75.00 | 81.82 | 12.90 | 38.77 | 9.68 | 12.50 | 20.18 |
| Manufacturer's Package | 68.97 | 15.00 | 18.18 | 87.10 | 60.23 | 90.32 | 87.50 | 79.82 |
| Manufacturer's Package | 55.68 | 11.11 | 11.11 | 54.55 | 25.71 | 33.33 | 100.00 | 72.73 |
| Home-Grown System | 11.11 | 0.00 | 0.00 | 45.45 | 65.71 | 33.33 | 0.00 | 13.64 |
| Using Communications Monitor (%) | | | | | | | | |
| Name | 86.21 | 81.25 | 90.91 | 30.68 | 63.64 | 19.35 | 0.00 | 63.90 |
| Manufacturer's Package | 13.79 | 18.75 | 9.09 | 69.32 | 36.36 | 80.65 | 0.00 | 36.10 |
| Outside Vendor's Package | 25.00 | 0.00 | 0.00 | 62.96 | 48.15 | 66.67 | 0.00 | 88.74 |
| Home-Grown System | 4.17 | 68.75 | 70.00 | 37.04 | 42.59 | 33.33 | 0.00 | 1.47 |
| Using Integrated Word Processing Functions (%) | | | | | | | | |
| Planned Acquisitions/Implementations for 1982 (%) | | | | | | | | |
| Additional Software from the Manufacturer | 3.45 | 18.75 | 18.18 | 34.09 | 35.23 | 19.35 | 12.50 | 22.94 |
| Expansions to Data Communications facilities | 68.97 | 68.75 | 81.82 | 34.09 | 60.23 | 35.48 | 0.00 | 27.52 |
| Distributed Processing capabilities | 58.62 | 25.00 | 27.27 | 35.23 | 53.41 | 35.48 | 25.00 | 40.37 |
| Expansions to present hardware | 58.62 | 31.25 | 72.73 | 11.36 | 13.64 | 12.90 | 0.00 | 20.18 |
| Another Computer System, same model | 6.90 | 25.00 | 0.00 | 3.41 | 9.09 | 29.03 | 25.00 | 41.28 |
| Business graphics | 6.90 | 12.50 | 18.18 | 1.14 | 3.41 | 6.46 | 0.00 | 4.63 |
| Plans for system replacement in 1982 (%) | | | | | | | | |
| Yes, same manufacturer | 17.24 | 12.50 | 0.00 | 10.23 | 7.95 | 22.58 | 0.00 | 10.09 |
| Yes, vendor unknown | 3.45 | 12.50 | 9.09 | 0.00 | 2.27 | 19.35 | 25.00 | 5.50 |
| Yes, different vendor | 72.41 | 62.50 | 90.91 | 87.50 | 88.64 | 41.94 | 50.00 | 76.15 |

| Manufacturer and Model | Magnum Series | NAS AS 3, AS 4, AS 5 & AS 6 | NAS AS 5000, 7000 & 9000 | NCR Century Series | NCR 8400 Series | NCR 8500 Series | Singer System 10 | Spartan Universe 90/30 & 90/40 |
|--|---------------|-----------------------------|--------------------------|--------------------|-----------------|-----------------|------------------|--------------------------------|
| Significant Advantages (%) | | | | | | | | |
| Users are happy with response time | 88.97 | 43.75 | 45.45 | 19.35 | 59.09 | 57.95 | 87.50 | 41.28 |
| System is easy to expand/reconfigure | 88.97 | 31.25 | 38.36 | 35.48 | 69.32 | 77.27 | 75.00 | 47.71 |
| System costs were less than expected | 88.97 | 0.00 | 9.09 | 16.13 | 13.64 | 20.45 | 50.00 | 32.94 |
| Hardware/software systems are compatible, as vendor promised | 88.97 | 56.25 | 63.64 | 54.55 | 60.23 | 71.55 | 0.00 | 35.53 |
| Terminals/peripherals carried over from other systems, as compatible, as vendor promised | 86.21 | 56.25 | 63.64 | 22.88 | 37.50 | 94.55 | 12.50 | 11.93 |
| System is power/energy efficient | 93.10 | 31.25 | 45.45 | 6.45 | 21.59 | 28.41 | 0.00 | 7.34 |
| Productivity and help us keep programming costs low | 17.24 | 0.00 | 9.09 | 6.45 | 12.50 | 32.95 | 12.50 | 33.94 |
| Down-base language is efficient and effective | 10.34 | 12.50 | 9.09 | 0.00 | 1.14 | 17.05 | 0.00 | 5.50 |
| Delivery and/or installation of equipment was ahead of schedule | 62.07 | 25.00 | 45.45 | 19.35 | 18.18 | 19.32 | 0.00 | 18.35 |
| Delivery of required software was ahead of schedule | 13.79 | 6.25 | 9.09 | 9.68 | 11.35 | 6.82 | 0.00 | 4.59 |
| Significant Problems (%) | | | | | | | | |
| Vendor proposed by vendor was too small | 3.45 | 12.50 | 0.00 | 0.00 | 7.05 | 4.55 | 0.00 | 20.18 |
| Installation of required software was late | 10.34 | 6.25 | 0.00 | 3.23 | 20.23 | 17.05 | 0.00 | 5.50 |
| System costs for hardware, vendor-supplied software, support exceeded the expected total | 10.34 | 0.00 | 0.00 | 9.68 | 13.64 | 1.14 | 0.00 | 16.51 |
| Vendor did not provide all the promised software or support | 10.34 | 12.50 | 18.18 | 12.90 | 25.00 | 19.32 | 12.50 | 20.18 |
| Hardware/data compatibility not what vendor promised | 0.00 | 0.00 | 0.00 | 0.00 | 6.82 | 2.27 | 0.00 | 5.50 |
| Terminals/peripherals compatibility not what vendor promised | 0.00 | 0.00 | 0.00 | 0.00 | 6.82 | 3.41 | 0.00 | 4.59 |
| Vendor enhancements/changes to hardware/equipment is excessively noisy | 0.00 | 6.25 | 0.00 | 22.58 | 15.91 | 11.36 | 12.50 | 20.18 |
| Power and/or cooling requirements are excessive | 0.00 | 6.25 | 9.09 | 16.13 | 4.55 | 1.14 | 12.50 | 10.09 |
| System Ratings (4.0-1.0) | | | | | | | | |
| Ease of operation | 3.83 | 3.13 | 3.64 | 3.18 | 3.43 | 3.19 | 3.38 | 3.16 |
| Reliability of Mainframe | 3.34 | 2.44 | 3.64 | 3.51 | 3.47 | 3.42 | 3.42 | 3.38 |
| Reliability of Peripherals | 3.15 | 2.33 | 2.91 | 3.11 | 3.23 | 3.10 | 2.88 | 2.98 |
| Maintenance service | 3.46 | 2.81 | 3.45 | 3.31 | 3.19 | 3.06 | 3.13 | 3.21 |
| Responsiveness | 3.21 | 2.66 | 3.18 | 3.02 | 3.06 | 3.03 | 3.00 | 3.00 |
| Efficiency | 3.11 | 2.56 | 2.82 | 2.47 | 2.64 | 2.48 | 2.43 | 2.41 |
| Technical support | 3.08 | 2.06 | 2.78 | 2.48 | 2.73 | 2.65 | 2.43 | 2.35 |
| Trouble-shooting | 3.04 | 2.20 | 2.89 | 2.44 | 2.59 | 2.48 | 2.71 | 2.30 |
| Documentation | 3.31 | 3.09 | 2.83 | 3.02 | 3.13 | 3.10 | 3.43 | 3.12 |
| Manufacturer's software | 3.15 | 3.09 | 2.80 | 2.92 | 3.05 | 3.10 | 3.38 | 3.12 |
| Operating system | 3.00 | 3.22 | 2.75 | 2.56 | 2.65 | 2.63 | 3.00 | 2.46 |
| Compilers & Assemblers | 3.33 | 3.09 | 3.00 | 2.95 | 3.03 | 2.77 | 2.63 | 3.02 |
| Applications Programs | 3.59 | 2.91 | 3.00 | 3.00 | 3.18 | 2.75 | 2.00 | 2.84 |
| Ease of conversion | 3.59 | 2.77 | 3.45 | 2.99 | 3.10 | 3.00 | 3.63 | 2.94 |
| Overall satisfaction | 3.59 | 2.77 | 3.45 | 2.99 | 3.10 | 3.00 | 3.63 | 2.94 |
| Did the system do what you expected it to do? (%) | | | | | | | | |
| Yes | 95.10 | 81.25 | 90.91 | 82.56 | 92.05 | 100.00 | 100.00 | 83.33 |
| No | 0.00 | 18.75 | 0.00 | 8.14 | 2.27 | 0.00 | 0.00 | 10.19 |
| Haven't decided | 6.80 | 0.00 | 9.09 | 9.30 | 5.68 | 0.00 | 0.00 | 6.48 |
| Would you recommend system to another user? (%) | | | | | | | | |
| Yes | 93.10 | 56.25 | 90.91 | 78.16 | 85.23 | 51.61 | 85.71 | 64.22 |
| No | 0.00 | 43.75 | 9.09 | 9.20 | 5.68 | 38.71 | 14.29 | 23.85 |
| Haven't decided | 6.80 | 0.00 | 0.00 | 12.64 | 9.09 | 9.68 | 0.00 | 11.93 |

| Survey Item | | Manufacturer and Model | | Survey Item | | Manufacturer and Model | |
|---|--------|------------------------------------|--|---|--------|------------------------------|----------------|
| No. of User Responses | 11 | Sperry Univac 90/60, 90/70 & 90/80 | | No. of User Responses | 14 | Sperry Univac 1100/62 Series | (Other Models) |
| No. of Systems Represented | 14 | | | No. of Systems Represented | 27 | | |
| Avg. Life of System (Mos.) | 41.4 | | | Avg. Life of System (Mos.) | 30 | | |
| Acquisition Method (%) | | | | Acquisition Method (%) | 42 | | |
| Purchase | 33.33 | | | Purchase | 33.1 | | |
| Rental or Lease from Mfr. | 34.38 | | | Rental or Lease from Mfr. | 34.38 | | |
| Lease from 3rd Party | 44.44 | | | Lease from 3rd Party | 55.66 | | |
| | 9.09 | | | | 6.25 | | |
| Principal Applications (%) | | | | Principal Applications (%) | | | |
| Accounting/Billing | 88.89 | | | Accounting/Billing | 66.63 | | |
| Banking—check processing/loans/savings | 9.09 | | | Banking—check processing/loans/savings | 6.25 | | |
| Construction—Architecture | 18.18 | | | Construction—Architecture | 7.41 | | |
| Education—admission/administration | 18.18 | | | Education—admission/administration | 9.38 | | |
| Health care—Medical | 18.18 | | | Health care—Medical | 18.18 | | |
| Insurance | 9.09 | | | Insurance | 31.25 | | |
| Manufacturing | 9.09 | | | Manufacturing | 6.25 | | |
| Mathematics/Statistics | 18.18 | | | Mathematics/Statistics | 28.13 | | |
| Order Processing/Inventory Control | 36.36 | | | Order Processing/Inventory Control | 29.63 | | |
| Payroll/Personnel | 54.55 | | | Payroll/Personnel | 31.15 | | |
| Process control | 72.73 | | | Process control | 53.13 | | |
| Purchasing | 9.09 | | | Purchasing | 68.75 | | |
| Sales Distribution | 0.00 | | | Sales Distribution | 62.96 | | |
| Other | 45.45 | | | Other | 57.14 | | |
| | 9.09 | | | | 0.00 | | |
| | 27.27 | | | | 0.00 | | |
| | 50.00 | | | | 42.86 | | |
| | 33.33 | | | | 37.04 | | |
| Source of Applications Programs (%) | | | | Source of Applications Programs (%) | | | |
| In-house personnel | 100.00 | | | In-house personnel | 100.00 | | |
| "Packaged" programs from manufacturer | 45.45 | | | "Packaged" programs from manufacturer | 85.71 | | |
| Contract Programming | 27.27 | | | Contract Programming | 28.57 | | |
| Manufacturer's Personnel | 37.50 | | | Manufacturer's Personnel | 51.85 | | |
| Proprietary Software Packages | 29.63 | | | Proprietary Software Packages | 35.71 | | |
| | 11.11 | | | | 21.43 | | |
| Location of Computer (%) | | | | Location of Computer (%) | | | |
| Distributed Processing Site | 0.00 | | | Distributed Processing Site | 0.00 | | |
| Central Processing Installation | 100.00 | | | Central Processing Installation | 100.00 | | |
| Using Local Workstations/Terminals (%) | | | | Using Local Workstations/Terminals (%) | | | |
| Using Remote Workstations/Terminals (%) | | | | Using Remote Workstations/Terminals (%) | | | |
| Using Data Base Management System (%) | | | | Using Data Base Management System (%) | | | |
| Manufacturer's Package | 54.55 | | | Manufacturer's Package | 74.07 | | |
| Outside Vendor's Package | 45.45 | | | Outside Vendor's Package | 15.63 | | |
| Home-Grown System | 83.33 | | | Home-Grown System | 25.93 | | |
| | 16.67 | | | | 78.67 | | |
| | 0.00 | | | | 0.00 | | |
| Using Communications Monitor (%) | | | | Using Communications Monitor (%) | | | |
| None | 90.91 | | | None | 87.50 | | |
| Manufacturer's Package | 9.09 | | | Manufacturer's Package | 12.50 | | |
| Outside Vendor's Package | 77.78 | | | Outside Vendor's Package | 18.52 | | |
| Home-Grown System | 11.11 | | | Home-Grown System | 78.57 | | |
| | 0.00 | | | | 95.45 | | |
| Using Integrated Word Processing Functions (%) | | | | Using Integrated Word Processing Functions (%) | | | |
| Planned Acquisitions/Implementations for 1982 (%) | | | | Planned Acquisitions/Implementations for 1982 (%) | | | |
| Additional Software from the Manufacturer | 18.18 | | | Additional Software from the Manufacturer | 50.00 | | |
| Proprietary Software from other suppliers | 36.36 | | | Proprietary Software from other suppliers | 62.96 | | |
| Software from other sources | 45.45 | | | Software from other sources | 66.67 | | |
| Distributed Processing capabilities | 54.55 | | | Distributed Processing capabilities | 78.13 | | |
| Expansions to present hardware | 63.64 | | | Expansions to present hardware | 33.33 | | |
| Another Computer System, same model | 9.09 | | | Another Computer System, same model | 33.33 | | |
| Business graphics | 0.00 | | | Business graphics | 15.63 | | |
| Plans for system replacement in 1982 (%) | | | | Plans for system replacement in 1982 (%) | | | |
| Yes, vendor unknown | 9.09 | | | Yes, vendor unknown | 9.38 | | |
| Yes, different vendor | 0.00 | | | Yes, different vendor | 0.00 | | |
| No | 90.91 | | | No | 94.44 | | |

... And Their Manufacturers

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EDITORIAL

A Shot in the Arm

The National Computer Conference could not have been better timed. Not economically, of course, but psychologically.

The computer industry's premier conference convenes this week in the midst of a deep recession. Major industries from automobiles to steel to housing are in economic shambles. By comparison, the computer industry is holding its own.

Nevertheless, a mood of uncertainty pervades the industry. That mood is matched by deep concern in the end-user community where DP executives, pushed by rapid technological development and prodded by demands for greater effectiveness of information resources in business, are searching for new solutions and new directions.

From all appearances, this year's conference should provide a shot in the arm for both groups.

The undercurrents of change rippling through the data processing profession are to a great extent caused by the rapid integration of computing, telecommunications and office automation. It is nearly impossible now to distinguish between these technologies. Nowhere will this integration be more evident than in the products displayed on the floor of the Astrodome.

While this integration will ultimately benefit both end users and DP professionals, the convergence has created confusion in the minds of DPs who must come to grips with it. Clearly the integration of these systems is causing a wholesale restructuring of the information resource function and calls for a new style of information management to exploit its effectiveness for corporate goals.

Those seeking answers and direction have come to the right place at the right time. The most complete panorama of computer technology — from hardware to services to components — will be on display by 684 exhibitors in 320,000 square feet of exhibit space. Meanwhile, many of the 80 technical sessions this week will focus on how the DP professional's function integrates with the corporate structure.

To the credit of the American Federation of Information Processing Societies, Inc., the show's sponsor, this year's sessions are less academic and more business-oriented, designed indeed with an eye toward "Advancing Professionalism," the theme of this year's conference.

NCC '82 may be just the lift this industry needs.

DATA PAST

Five Years Ago June 20, 1977

DALLAS — The first National Computer Conference in the South-west in six years convened in a relaxed and friendly mood, buoyed by a healthy industry and Texas-sized hospitality.

"Distributed processing" was the phrase of the hour on the exhibit floor, but it took some hard knocks in at least one of the sessions. Data base management — difficult to display in the exhibit hall — was a popular hot button in the sessions.

DALLAS — The "aspiration explosion" for the concept of distributed data processing is "far beyond what can be achieved," Dr. Gene Amdahl contended in a National Computer Conference session.

Ten Years Ago June 28, 1972

KNOXVILLE, Tenn. — Manual delays in data preparation for computer input resulted in a law suit and court decision against an insurance company.

Mr. and Mrs. Robert Lane Jr. won their case, a \$21,100 judgment against Traveler's Indemnity Insurance Co., in Chancery Court.

CHERRY HILL, N.J. — Two Value Computing sales representatives were among the victims of a gunman who ran through an office building here, killing six men and wounding six others.

Theodore G. Hall was killed and Val Riskoe was critically wounded. Value Computing was one of eight firms with offices in the building.



'Your Honor, my straight-A computer science major client pleads entrapment. The university's tightened-up computer security system presented him with an irresistible challenge to crack it!'

LETTERS

'Relational' Not Buzzword

In two recent articles, "Relational Remains Buzzword, Not Practice" [CW, May 17] and "Codd Sees Mixed Fate for Going Relational" [CW, April 26], it is alleged that I have a pessimistic view regarding the suitability of the relational approach for large systems and large data bases. Let me assure *Computerworld's* readers that my view is quite the opposite.

I see many reasons why relational systems should be highly successful and, in the long run, overtake other approaches in numbers of systems installed — whether on large, medium or small-scale hardware configurations. In fact, there are already some significant successes on record.

The marketing of relational systems is, of course, still in its early stages. In evaluating the success of this marketing (especially in the large systems area), it is important to keep in mind the distinction between the new market and the replacement market.

In the '80s the thing to watch is the new market. Watch for situations in which users not already committed to data base systems choose a relational system over other approaches. Watch also for installations of relational systems as partners to already-installed nonrelational systems.

Some of the relational partners may start off in a subordinate role, but it will be interesting to see how long they remain subordinate when their data base analysts, programmers, users and managers become aware of the outstanding productivity achievable with the relational approach.

It is sheer nonsense to assert that "relational" is still just a buzzword. You might as well call the term "space shuttle" a buzzword.

There are numerous, large-scale production installations of Tandem Computers, Inc.'s Encompass relational system. According to Tandem, more than 500 large corporations and financial institutions are performing their on-line transaction processing using Encompass. The majority of the Encompass data bases range from one to 10G bytes in size (although some exceed 20G bytes) and each data base supports anywhere from 100 to 2,000 terminals.

To cite another example, System R has been used since 1978 as the data base management system for on-line financial and schedule control of software development projects for all program products produced by the IBM Santa Teresa (Calif.) Laboratory. One of the Santa Teresa projects being managed by System R is none other than IMS.

The fact that some people are misusing the term "relational" in no way cancels out the effectiveness of true relational systems. *Computerworld* can help keep the public properly informed if they continually stress the distinction between true relational systems and others.

A true relational system requires all information to be represented at the logical level as values in tables. There must be no user-visible navigation links between tables and the system must support (in some form) at least the select, project and join (natural or equijoin) operators of the relational algebra.

Finally, it is high time that the trade press take note of the actual accomplishments of relational systems instead of continually misrepresenting these systems as "paper tigers."

E.F. Codd
IBM Fellow
IBM
San Jose, Calif.

SOFTLINE / Werner L. Frank†

Sorting Out On-Line Applications

The recent explosion of CRT terminal use and the proliferation of personal computers have focused attention on software appropriate for developing and executing on-line applications. In evaluating such software, it is necessary to differentiate carefully between what I call software supporting interactive systems and software providing an appropriate environment for a transaction processing-oriented system.

In this discussion, consideration is limited to "people-driven" on-line systems, as opposed to on-line systems that may be connected to and/or driven by external data sources that are not human generated.

This latter category of applications typically leads to on-line systems that have a real-time flavor.

The range of people-driven on-line systems is shown in the chart on this page, where 12 characteristics are identified and compared for the two types of on-line processing.

Perhaps an example will serve to make the difference clear. The airline reservation application is probably the best and most often referenced transaction processing system. It has thousands of miles of communications lines linking tens of thousands of terminals to a number of mainframe computers, all working in tandem and in a production mode.

In contrast, a planning tool, utilizing spreadsheet analysis procedures, is an application normally performed in an interactive environment where there is a one-to-one coupling of the individual and a computer. The pace of the operation is determined by human analytical processes.

At first glance, the response time

requirements for both of these environments seem almost the same. In transaction processing, however, the requirement for a response time of less than three seconds is an entirely different kind of processing demand from a similar requirement in interactive computing.

Heavy Load

In transaction processing, when a screen message is transmitted, a heavy load is typically placed on the computer.

In interactive computing, usually a single and simple command is given at transmission time, creating a much smaller load on the computing facility as each processing step takes place. Transaction processing employs many terminals hooked to one computer, or there may be a few dozen users time-sharing a single computer.

The throughput requirements in the case of transaction processing are very high for two reasons. First, the system usually contains many, many terminals. Second, transaction processing is characteristically required by large, complex applications. On the other hand, in interactive computing, with only one user, there is a moderate requirement for throughput performance.

With respect to numbers of applications, the transaction processing system usually involves one rather broad application. In interactive computing, there are likely to be many individual applications that can be selected one at a time.

Shared data is a typical requirement in transaction processing, whereas data is likely to be personal and limited to one user for the interactive

| | Transaction Processing | Interactive Computing |
|------------------------|---|--------------------------------------|
| Response Time | 1-3 seconds | 3-5 seconds |
| Number of Users | many | few to many |
| Throughput | high | moderate |
| Number of Applications | one | many |
| Shared Data | yes | no |
| Reliability | high | limited |
| Security | high | limited |
| Recovery | high | limited |
| Audit | high | limited |
| Communications Mode | block mode | conversational |
| Screen Mode | fill blanks | prompting |
| Environment | telecommunications (for example, CICS) | interpretative (for example, TSO) |
| Example | airline reservations | spreadsheet analysis |

'People-Driven' On-Line Systems

example.

Next are the key environmental requirements of reliability, security, recovery and audit. All of these have high priority for transaction processing systems. Indeed, such systems may have to operate around the clock throughout the entire week.

Since they handle critical information, there must be a sophisticated start-up and recovery process. An adequate security and audit capacity is required to protect them.

Interactive Computing

In interactive computing, none of these four environmental parameters is absolutely necessary. If they are available, all the better. In such systems, however, the user usually provides whatever recovery and audit facilities are required.

The reliability and security of the system either depend upon the existing operating system in which functioning takes place or result from the utilization of private, personal diskettes.

With respect to the terminal and communications operations, the transmission mode in transaction processing is typically a block mode facility, since the terminal operator is expected to provide a good number of parametric entries into a form shown on the screen.

This is in contrast to the conversational mode of performance often associated with interactive computing. The screen mode, therefore, becomes a fill-in-the-blank process for transaction processing, whereas a line-by-line prompting is more typical in interactive computing.

The difference in performance requirements for these two distinct on-line systems leads to the requirement for a sophisticated telecommunications monitor system, such as IBM's CICS, for transaction processing systems, whereas interactive computing can get by with interpretative systems that simulate an on-line environment. A good example would be the command processor portion of

(Continued on Page 68)

GETTING AHEAD IN DP / Donald J. Berardo†

Future Trends in Compensation Packages

New trends are arriving in the data processing field that will make compensation more flexible and more responsive to individual performance and needs. In the future, companies will become more competitive in trying to create and install such programs.

Currently, employers are offering DPs 10% higher average earning packages than other workers. During the '80s, marketplace pressure will continue to drive up the salaries of DPs disproportionately to other jobs within the industry. This will force the people in charge of internal job evaluation plans to devise new systems of compensation.

For instance, a large insurance company recently developed a compensation program that includes a "market-driven" pay scale, quarterly salary review and increases and bonuses to recognize outstanding contributions.

Rather than having total benefit packages that are the same for all employees, companies will offer more of a "cafeteria-style" benefit program. Employees will be able to pick

and choose individual programs that suit their particular needs up to a given budgeted amount.

This will allow the young employee with a growing family to select a different set of benefits than a senior single employee might choose.

Merit Increase Plan

Some companies have already adopted the lump sum merit increase plan. This allows employees to elect to take part or all of their merit increase at the start of the year, rather than having it spread out in every paycheck.

The amount is usually reduced to figure present value, and there is usually a clause that demands repayment if the employee leaves during the year. This plan allows the employee to have lump sums of cash for special purchases or investment.

The following year, the amount of the merit increase is built into the employee's base salary and they then have the same choice with their new merit increase.

Rather than giving across-the-board cost-of-living increases, more

companies probably will spend their compensation dollars rewarding outstanding performance and productivity through various forms of incentive compensation.

These forms could include such things as bonus plans or profit-sharing plans. But the common thread will be a more direct relationship between the individual's performance and the department's/company's success.

A "negative hierarchy" will be another future development in DP compensation. Because of the need to pay competitive salaries to people who are technical specialists, companies will have to address the question: Can we pay more to technical specialists than we do to their managers?

More and more, the answer will be "yes." Companies will recognize that the manager's job is to supervise, regardless of whether they are making more or less than the people under them.

On the other hand, DP managers will be much better paid in the future. According to a recent Adminis-

trative Management Society survey, DP managers were the third highest-paid middle-management group in the U.S. (with plant managers and sales managers coming in higher).

But the need for qualified DP managers will increase as DP technology progresses, and that means higher salaries for managers.

It is certain that in the future DPs will be looking for more than money. They will want to be assured of job satisfaction, they will want ample time off and they will want to work in a professional, comfortable environment.

They will also want more information about how their salaries, promotions and bonuses are calculated. In the old days, the reasons for salary and promotion decisions were often kept secret.

That is changing swiftly. In the future, companies and managers will have to provide the "why."

Berardo is a management counselor and career therapist. He is a vice-president with the Meld Group in Newton, Conn., publishers of a monthly newsletter on management development.

HUMAN CONNECTION/Jack Stone

Task Control Key to Managing DP Center Staff

The timeworn data center motto of "unlimited service to the users," it seems to me, is way out of kilter with respect to the realities of data center capabilities. It probably should be changed to something like "service

to the users within the resources of the data center."

This issue relates to the subject of "task management," which refers to the management of multiple projects, as distinguished from "project management," which refers to single ones.

As is well known, in every data center there is a veritable "Pandora's box" of systems tasks that center managers try to control. Some of these tasks are development efforts, others are implementation actions, still others are in the maintenance category and, of course, the vast majority are user requests under investigation or pending same.

The point to be made is this: In the past, most centers have focused on effective project management, which

want to create another major data processing system at the time.

"Besides, there was no need to sort or select on tasks, so word processing software was quite acceptable. Indeed, it had the additional advantage of eliminating the need for follow-up systems maintenance.

"The task management system — which, incidentally, is still in operation — generated three lists that covered, respectively, tasks waiting assignment, tasks in progress and tasks completed."

Letters to Stone should be addressed to him at Box 270, 1377 K. St. N.W., Washington, D.C. 20005.

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This is Part 6 of a continuing series on how to succeed as a data center manager.

is aimed at bringing up a system on schedule within circumscribed budgets and personnel resources. All well and good.

The problem is that not enough centers have implemented a decent information system for classifying and prioritizing tasks for the staff and then tracking the flow of tasks through staff reporting.

Task control plays a significant role in managing systems personnel in that it helps distribute the work on a rational basis, thereby minimizing overloading and excessive overtime.

Stephen Roberts, the systems and programming manager at the Catholic University of America data center, found himself in urgent need of such a system five years ago when he started his current job.

His staff of nine was then swamped with active tasks, so in a precipitous moment of high emotion, he arbitrarily deferred all but the two dozen most critical tasks as a first step toward reducing work loads and thereby forcing the staff to work normal hours.

But the analysts and programmers were incensed and belligerent at the announcement of this decision because they didn't want to be controlled. However, they quieted down after a few months, presumably to think the matter over.

"After all," one was heard to say, "if we put time in during business hours, maybe we can have an active social life for ourselves in the evenings."

But Roberts was stuck with resolving the unassigned tasks. "Believe me, I didn't cherish the job of analyzing hundreds of tasks to determine their priority or, even more important, their validity, but I had no choice," he said.

"As a first step in digging myself out of the mess, I had to inventory all tasks and their status. I implemented a simple task management system using word processing software because I had little inclination to expend my efforts on internal administration and I certainly didn't

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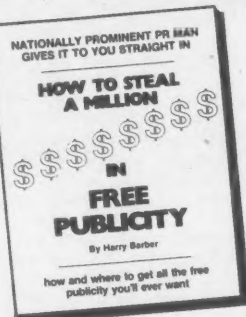
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Programmer's Problem

I live in close proximity to perhaps the "citadel" of data processing, Hartford, Conn., and I think your readers would be interested in sharing some of my observations on a topic I have not seen addressed in *Computerworld*: entry-level programmers.

I was a graduate student at Wesleyan University when I subscribed to your excellent publication. As a student, it was quite easy to generate a lot of enthusiasm about the rapid developments in the computer field.

There are extant, however, many hard realities and disappointments

awaiting the newly spawned DPer that seem to be overlooked in popular literature on the subject.

Despite acknowledged expertise in a programming language and a particular mainframe, a candidate must still be trained on another operating system and in file handling and access methods.

Given the current economic climate, a company takes a substantial risk in committing itself to pay \$14,000 to \$16,000 to someone with

no prior experience, no matter how well trained.

With the proliferation of single courses and full curriculum offerings at junior colleges, in addition to increased enrollment at technical training schools, the pool of applicants has increased drastically, seemingly giving prospective employers the option of acting arbitrarily in their selection procedures.

Those of us in the pool, therefore, are faced with a Catch-22 situation.

Perhaps we are fluent in a language or well versed in an application, but we are unable to prove it due to lack of experience.

Randall W. Lombardi
Middletown, Conn.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters may be edited for purposes of brevity and clarity. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, P.O. Box 880, Framingham, Mass. 01701.

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Magic Boxes?

I am not convinced that resistance to the incursion of microcomputers on the part of DP directors is the result of empire-building and perceived threat, as some of *Computerworld's* articles imply.

The users seem to think that these little boxes are magic. They don't realize that they would have to learn the system, analyze their needs, design their applications, code them or buy software and enter their data

before the computer will be of any use to them.

If they had been willing to do all that in the first place, they'd be happy with their mainframes and there wouldn't be any problem.

DP centers are in the business of providing just those services to their organizations.

While we don't have any objection to microcomputers

in principle, we ultimately will be responsible for them as we are the central facility. That being the case, we'd as soon acquire these devices at a rate commensurate with our ability to handle additional work.

E.G. Johnston
Director
Computer Center
Western Maryland College
Westminster, Md.

LETTERS

Give MIS a Break

What is a poor management information systems (MIS) manager to do? On the one hand, expert after expert has been shouting at MIS managers to become more "managerial," to rise up out of the technology sandbox and, well, *manage*. Only in this way will MIS ever be able to fulfill expectations, get its

house in order, reduce backlogs, increase productivity and so on.

Now along comes management consultant Gopal Kapur "Exec Claims DP Managers Failing to Keep Pace" [CW, May 17] to say that MIS managers are beoming technologically obsolete and are losing credibility in their own departments as a result. Kapur seems to want to have his cake and eat it too. He suggests MIS managers don't do enough strategic planning and have "virtually no experience in organizational management."

Howewver, at the same time, he claims they need to devote more time to "knowledge maintenance" and keep fully technically up-to-date or risk "losing credibility in the eyes of the programmers." What nonsense!

Surely as a manager rises in an organization he takes on new challenges and relinquishes old ones. MIS managers simply cannot maintain the same level of technical sophistication they had when they were project managers or lead analysts. Nor should they. After all, that's what staffs are for. I vote that we give MIS managers a break and only ask them to do what's humanly possible.

Prof. Sid Huff
U. of Western Ontario
London, Canada

Sorting Systems

(Continued from Page 65)
the TSO environment.

In examining software for both mainframes and microprocessors and when evaluating application generators and data management systems, it is necessary to understand the differences outlined above.

From the promotional material associated with these products, it is often not clear whether they belong in the transaction processing arena or in the interactive computing camp.

Frank is executive vice-president of Informatics General Corp. in Woodland Hills, Calif.



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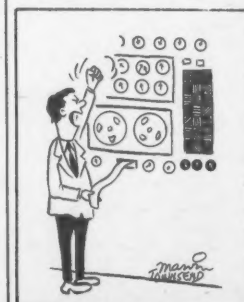
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(Or how the hardware fault tolerant solution has made the software fault tolerant solution obsolete.)

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You can build a double computer inside one box for less dollars, as opposed to doing it in software, which continually needs maintenance and revision, as well as improvement."

by Aaron Goldberg
of IDC which
appeared in Computerworld's
December 28, 1981 issue.

Now that the computer age is in full stride, 100% availability is fast changing from a luxury to a necessity. Downtime and its costs are unacceptable, especially when there is an alternative. Now that fault tolerant operation is becoming a universal requirement, there is demand for an improvement over the software approach used by Tandem. These computers must provide better performance, be easier to use, be easier to program and re-program, be less complicated and less expensive. We believe that the Stratus hardware based fault tolerant system answers these demands. Let us explain.

Why more hardware is better than more software.

The crux of the problem with software based systems is that they require complex, performance stealing software to provide fault tolerant operation. This software robs the system of precious resources because it uses processing cycles to pass status and checkpoint information back and forth between two computers. What's more, this passing of information occurs at four levels: operating system, user program, file management, and terminal control.

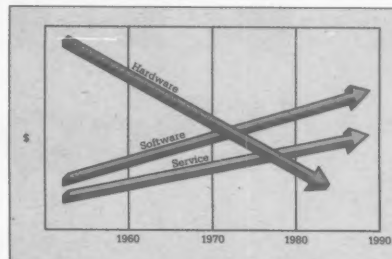
Stratus, meanwhile, has eliminated all this reliability software by having duplicate hardware components tightly coupled, dedicated to performing the same tasks at the same time. It's like having two computers in one, rather than two separate computers. Checking hardware logic detects errors with no performance loss and stops failing components instantly. The duplicate partner continues without interruption, unaffected



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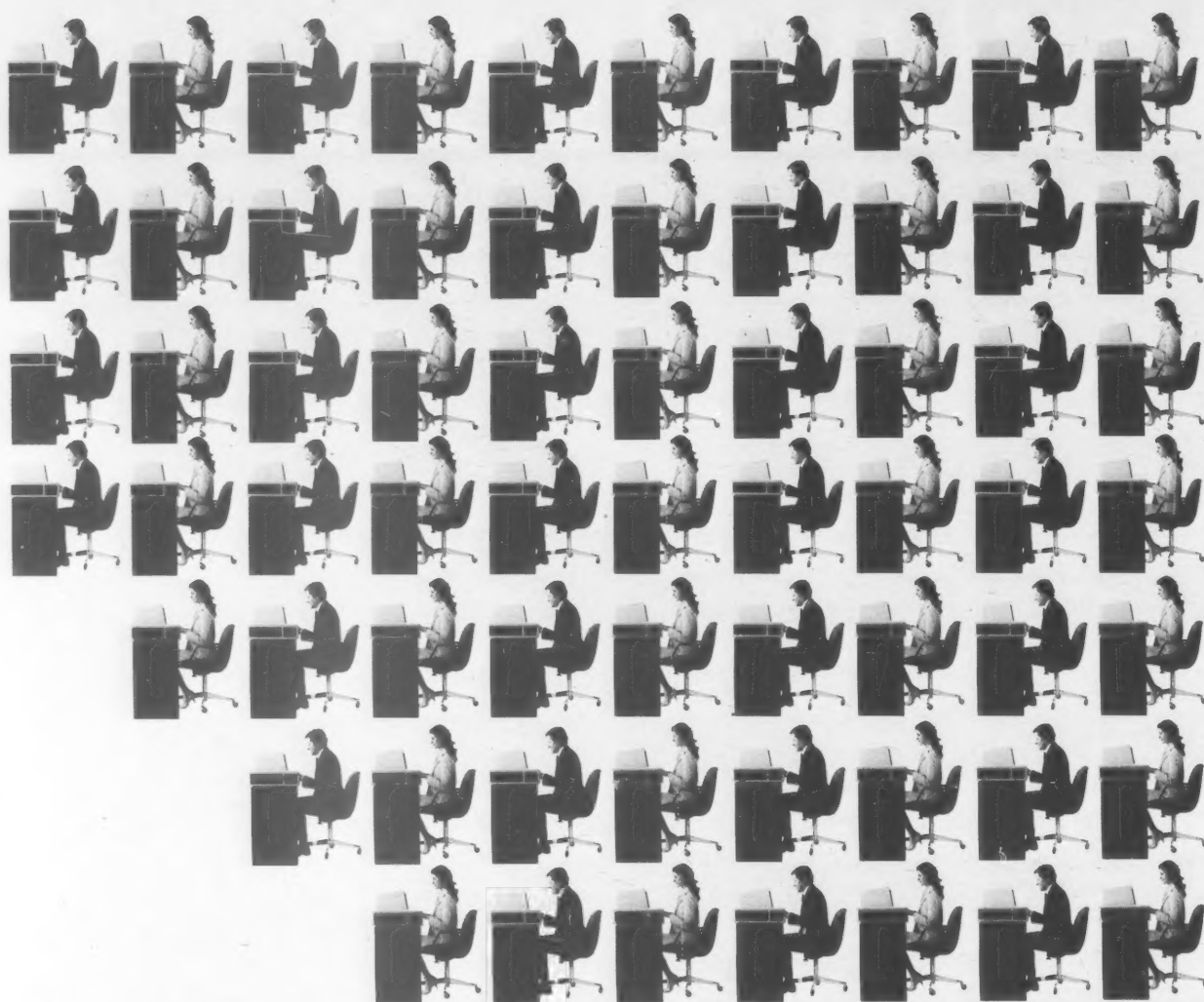
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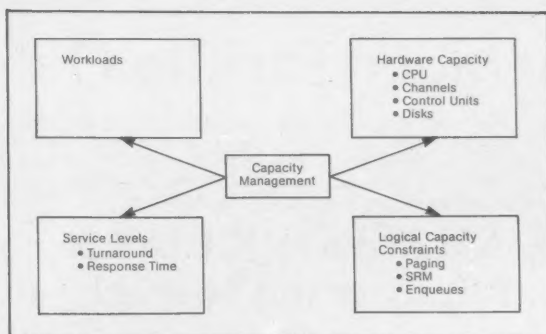
INTRODUCTION TO THE TOOLS OF STRUCTURED ANALYSIS

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Epilog/MVS

Candle Gives MVS Users Capacity Management Tool

LOS ANGELES — Candle Corp. has announced a capacity management package for users of IBM's MVS operating system that reportedly provides data center personnel with reports detailing relationships between work loads (TSO, batch), service levels (response and turnaround time) and capacity (hardware).

Epilog/MVS is basically a background monitor with an interactive capability that can query the data base from batch or TSO environments, a Candle spokeswoman explained. It was designed to provide information on how MVS tasks are being degraded by physical bottlenecks, such as CPU, disks, channels and control units. This information is collected, as well as the effects of logical capacity constraints such as the System Resources Manager, paging and enqueues.

Also included in Epilog/MVS is a report-writing feature that reportedly provides flexible reporting by date, time, job, program, class, performance group and period. In addition, it lists the causes of degraded performance and quantifies their impact. A set of standardized reports for management is included in the package.

Epilog/MVS maintains historical data in its own data base or in the System Management Facility as an option, the vendor noted, adding that a set of utilities is provided to enable sites to manage the Epilog/MVS historical data base.

The software was developed to help data center managers

understand why jobs are running slower than usual or why on-line development terminals (TSO) are having poor response time.

Available on a permanent license basis for \$19,500, Epilog/MVS can be installed in about one hour on all versions of IBM MVS/370 and compatible systems, including SP, SE and non-SE systems, Candle said. It does not require Candle's Omegamon and Dexan performance monitoring packages, but can be operated from an Omegamon terminal.

Candle is located at Suite 2404, 10880 Wilshire Blvd., Los Angeles, Calif. 90024.

Written in Pascal

Ada Syntax Checker Introduced

CAMBRIDGE, Mass. — Intermetrics, Inc. has introduced an Ada syntax checker called Adasynch that is a Pascal program designed to check the grammatical form of a source program written in Ada, the programming language standard defined by the U.S. Department of Defense.

Intended as an educational tool, the software reportedly will run on most computers that support Pascal. This includes IBM and plug-compatible mainframes, as well as Digital Equipment Corp. PDP-11 systems, Data General Corp. Eclipse computers and some microcomputers. It not only determines whether a program is written with proper Ada gram-

mar and format, but also indicates where errors exist, the vendor said.

Adasynch is said to allow programmers to master the grammar and syntax of Ada before actual Ada compilers are available. It provides a line-numbered listing of the original Ada program showing both the type of error found and its exact location within a line. A cross-referencing program is included which provides a summary of programmer-defined names showing where they appear in the Ada source program. Adasynch was designed to distinguish the location where the name is defined from places where the name is used only as a reference.

run the software after it has been converted to its rigid standards (one-to-two-month delay).

- The package must be molded into the overall data base management structure established by the information management group (indefinite delay).

- The user desires some additional "minor" modifications (150 to 200 days).

- Documentation must be altered to meet corporate standards (60 to 90 days).

- Converting to the new system will require a redefinition of certain key fields requiring significant changes to existing systems (100 to 150 days).

- The conversion to the new system will require the user to manually convert a significant volume of data not previously considered (50 to 100 days).

Company B is fairly new to data processing and has just acquired its first computer, which was selected by the recently hired data processing manager. The new accounting applications are selected on the basis of

(Continued on Page 78)

By Paul J. Cosgrave

Special to CW

If properly installed, application software can result in a quicker installation and, therefore, reduce the demand for internal program development. However, major pitfalls can occur that will add adversely to the development backlog.

For example, company A has a highly centralized, advanced management information systems (MIS) department. A key component in managing the operation is the use of a firm set of well-structured systems development and operational control standards. An application software package was selected by a joint MIS user project team comprised of business systems analysts and first-time user personnel. The users have agreed to "minor" modifications. Management was told that the installation should take four to five months.

As the installation proceeds, numerous "road blocks" mysteriously appear catching the entire project team off guard:

- The data center will only

According to the vendor, Adasynch also can be used as an aid to understanding how Ada is compiled or translated. The Adasynch program has user-controlled options which trace lexical and syntactic action. The results are listed within the Ada program listing.

Adasynch consists of about 2,000 lines of Pascal source code and the cross-referencing program contains 50 lines of source code. A sample Ada program is included with the installation instructions. The package, delivered in source form on magnetic tape, is priced at \$900, the vendor said.

Intermetrics is located at 733 Concord Ave., Cambridge, Mass. 02138.

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6/82

ADR/Datacom System Generation Facility Out

PRINCETON, N.J. — Applied Data Research, Inc. (ADR) has announced the ADR/Datacom System Generation Facility, which was designed to allow an entire ADR/Datacom system — including up to eight individual products — to be installed simultaneously.

The System Generation Facility is available on IBM and plug-compatible systems running under the SSX/

VS(E), DOS/VS(E), OS/VS1 and MVS operating systems. It reportedly provides all of the files necessary on one tape and the procedure to move files from the distribution tape to a user's data processing installation. Users can generate the libraries necessary to support operation of ADR/Datacom products, the vendor said, noting that the facility also is used to install subsequent releases

of ADR/Datacom products.

The installation procedure is said to require only a single tape, which contains source, object and executable members, a library management utility program and user-supplied routines by product. The library management utility provides for automatic adjustment to the users' library block sizes, automatic calculation of library size requirements and

disk device independence, the vendor said.

The System Generation Facility is a no-cost option provided for current and future

users of ADR/Datacom products, a vendor spokesman said from Rt. 206 and Orchard Road, CN-8, Princeton, N.J. 08540.

Aid Reduces JCL Upkeep, Improves Job Throughput

JERICHO, N.Y. — A software package designed to avert problems in handling

job streams, reduce JCL maintenance and improve job throughput has been introduced here by Computer Associates International, Inc.

The new release, called Ca-Driver, was developed to run on IBM and plug-compatible mainframes in the OS/VS1 and MVS operating environment.

It will provide comprehensive job management facilities and enhance existing procedure library capabilities, according to a spokesman.

The package reportedly enables operating system programmers to catalog common JCL or tables of data in one procedure and call it from another procedure with Ca-Driver's nested procedure feature.

Ca-Driver is priced at \$7,200 for a three-year lease; other pricing plans are available.

The vendor can be contacted at 125 Jericho Tnpk., Jericho, N.Y. 11753.

Interactive Aid Running on VS Out For Builders

VIRGINIA BEACH, Va. — An on-line interactive software package for the construction industry, which is written in Cobol and said to run on Wang Laboratories, Inc.'s VS system or Ansi-compatible Cobol-based systems, is available from Metro Information Services, Inc.

The package is said to integrate business applications with a series of modules designed for use in the construction industry. The modules included in the package are job scheduling, payroll, purchasing/receiving, accounts payable, job costing, budget control, marketing support loan and draw accounting and general ledger.

The entire package sells for \$25,000 and includes education, training and implementation support. The modules are also available in three different packages. System A for office accounting is priced at \$11,250. System B for field accounting is also priced at \$11,250. System C, which is a combination of the two, is priced at \$19,500.

Metro Information Systems is located at Suite 507, 4510 Holland Office Park, Virginia Beach, Va. 23452.



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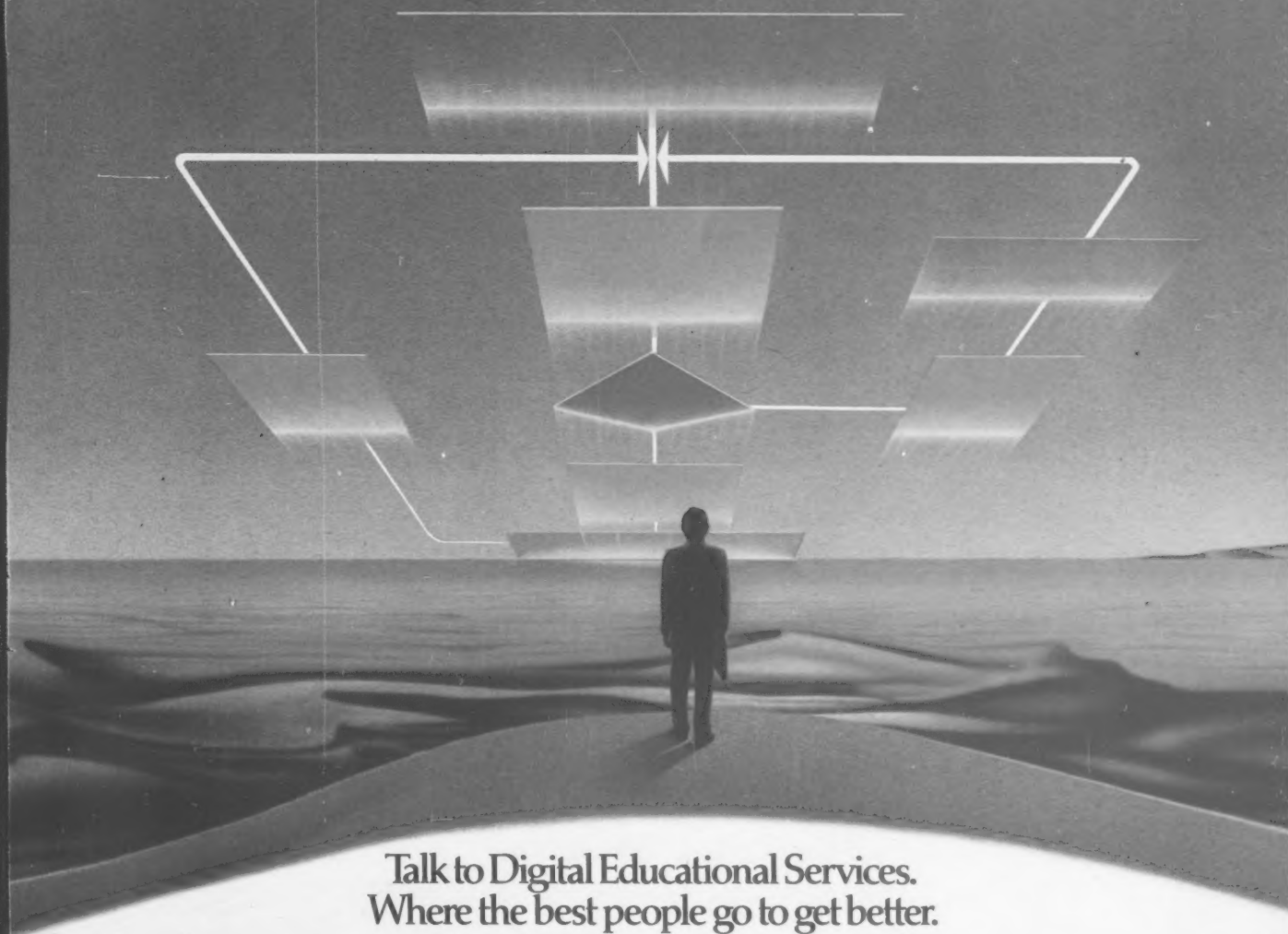


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Select Software Carefully Before Installation Ills Occur

(Continued from Page 73)

the hardware vendor's recommendation.

Suddenly, problems start to develop. Response times are no longer tolerable, information for specific inquiries is impossible to obtain and daily production schedules become more of a weekly reporting alternative. The proposed solution — a larger computer.

Can the types of problems that have occurred in these real-life situations be avoided?

Yes, by the use of a formal systems development methodology designed for application software selection. A methodology can help address the is-

suess before they become installation problems.

The probable use of application software should be first identified in the project definition phase. Then, the work plan for the requirements definition/design phase should be heavily oriented to the identification of user and technical requirements and the comparison of available software to these requirements. Issues such as package modifications, data base compatibility, data center acceptance and system performance capabilities should be thoroughly investigated prior to the purchase of the package.

A company can inherit serious downstream problems if it allows itself to purchase software simply because it is recommended by a hardware vendor or "appears" to meet the company's needs. A "request-for-proposal" process should be undertaken for each software purchase. Software intelligence should be obtained from publications, consultants, existing users and the various vendors. Prior to contacting vendors each application function should be described with specific user and technical requirements.

Vendor salesmen should not be considered the sole sources of information. It is important to obtain references in advance and contact these users.

With a project team comprising knowledgeable users and systems development analysts as well as a properly oriented selection methodology the pitfalls discussed in this article can be avoided or significantly reduced.

Paul J. Cosgrave is a senior manager with Arthur Andersen & Co. in New York City. He is a consultant to clients on application software and other MIS-related issues and specializes in system development management.

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Mail Package Has Three Versions

NEW YORK, N.Y. — A mailing list package running on Phase One Systems, Inc.'s Oasis system is now available in three separate versions from Integron Systems.

The Envoy packages can be used by people with no previous computer experience, the vendor said.

Envoy 1 is said to handle 65,000 address files with automatic sorting by Zip Code and alphabet. A sublist selection option with 455,000 address sort capability and interfacing to all Oasis-compatible word processors is available.

Envoy 2 has the same features as Envoy 1, according to the vendor, but with 975,000 address sort print-out capability. Envoy 3 handles 65,000 address files with the same automatic Zip Code sorting, sublist selection and word processor interface as Envoy 1 and 2.

Envoy 1 is priced at \$750, Envoy 2 is priced at \$500 and Envoy 3 is priced at \$250, according to the vendor.

Integron Systems is located at Suite 2J, 300 W. 109th St., New York, N.Y. 10025.

Package Verifies Who Owns Data Transferred Between Companies

LAGUNA NIGUEL, Calif. — Chapman & Associates has unveiled Signed Data, a package designed to verify ownership of computer processed data transferred between companies for use on IBM and plug-compatible systems running under OS.

Comprised of over 50 Basic assembler language routines, Signed Data is a software implementation of public key cryptography that has been developed specifically in response to the question of data security beyond the level of physical access.

It is based upon the use of a combination of a public cipher, or key, and a private, individually held key, the vendor explained. Each party in the communicating network is assigned both private and public keys. The list of public keys is kept up to date in a directory available to network members. Private keys are individually and confidentially assigned.

In a typical transaction between a sending firm and a receiving firm, the message will be encoded or enci-

phered first with the sending firm's private key, creating a digital signature and proof of authorship.

Then the message will be enciphered once again with the receiving company's public key, creating a digital seal that no one but the intended receiver may break, according to Chapman & Associates. The receiving com-

pany decodes it with its private key and then decodes it once again with the sending company's public key, thereby verifying the message's origin.

Signed Data is available for \$50,000/physical location. Multiple location discounts are available, the vendor said from 29605 Sea Horse Cove, Laguna Niguel, Calif. 92677.

Debugging Aid Designed For IBMs Under VM/CMS

HARTFORD, Conn. — A debugging aid for IBM and plug-compatible mainframes running under the VM/CMS operating environment has been introduced by Technology Consulting Corp.

Superbug runs under CMS and was designed to replace the CMS DEBUG command. The software reportedly incorporates a trace function and such debugging features as breakpoints and displays.

Superbug costs \$5,000/site, including one year of maintenance and an on-site training session for programmers. The vendor is located at Suite 607, 179 Allyn St., Hartford, Conn. 06103.

Giesco Cuts 'Hisam' Costs

ROCKVILLE, Md. — A price reduction in data storage costs for customers of the Hisam data base management system that is available via its time-sharing network has been announced here by General Electric Information Services Co. (Geisco).

The monthly cost for Hisam storage units has been lowered from 14 cents to eight cents (\$63.50/1M byte) for customers who agree to a fixed \$500/mo subscription fee for a one-year period. Lower unit prices are offered at higher monthly fees: seven cents/unit at \$1000/mo, six cents/unit at \$2000/mo and five cents/unit at \$4000/mo.

Geisco is based at 401 N. Washington St., Rockville, Md. 20850.

Inventory Tool Fits System/38

SAN DIEGO — Integrated Systems Management, Inc. has announced an inventory control package for IBM's System/38.

Features include line-entry printing of purchase orders, listing of vendor and item records and reporting back-order, obsolete and low-usage items, the vendor said.

The package costs \$8,950, the vendor said from 2515 Camino Del Rio S., San Diego, Calif. 92108.



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IBM Systems Get Optimizer Aid

PITTSBURGH, Pa. — Duquesne Systems, Inc. has announced a Program Management Optimizer, a performance enhancement package for IBM MVS or OS/VS1 operating systems.

The software was designed to replace IBM's Resident BLDL table, a static link list, with a managed link list. The Program Management Optimizer automatically changes the link list as the system work load changes, the vendor said.

The package costs \$5,000 for the first CPU, \$7,500 for two CPUs, \$10,000 for three and \$12,500 for unlimited CPU usage, the vendor said from 2 Allegheny Center, Pittsburgh, Pa. 15212.

Package Cuts Vsam Output

REXDALE, Ont. — Compute (Bridgend) Ltd. has introduced a software package designed to reduce the output of IBM's Vsam file maintenance software. Called CBLVTOC/Vcat, the package runs on the IBM and plug-compatible systems under OS, DOS and CMS.

The enhancement package will reduce the Vsam output of directory information said to be too voluminous. With this package, the output will be more manageable, the vendor said.

The package is available for \$2,000 from Compute (Bridgend) Ltd., Suite 107, 30 Baywood Road, Rexdale, Ont. M9V 3Z1.

Seven Packages Introduced For Stratus/32 System

NATICK, Mass. — Stratus Computer, Inc. has announced seven transaction processing, communications and networking software packages for its Stratus/32 Continuous Processing computer system.

The products are:

- Tranpro, a transaction processing package with integral network support designed to provide the system tools and structures needed to develop local or distributed processing applications. A Tranpro system license, which includes a Tranpro processing module license, is available for \$12,000. The Tranpro processing module license alone is available for \$1,500.

- Forms Management System, which was designed to create and manage terminal forms. The license price is \$4,000.

- IBM 3270 Terminal Support facility, which is intended to allow IBM-compatible terminals to be connected to a Stratus/32. The license fee is \$4,000.

- IBM 3270 Emulator Facility, which reportedly enables Stratus application programs to interactively access an IBM-compatible host. A license is available for \$5,000.

- X.25 Networking Facility, which is said to extend Stratus' support of X.25 to provide a communications capability between application programs on Stratus or other vendors' systems. The license fee is \$5,000.

- Fortran 77, which is said to be a full implementation of the Ansi-standard programming language. The license for the Fortran 77 compiler, which includes a runtime license, is available for \$8,000. The Fortran 77 runtime libraries license is available for \$1,000.

- An implementation of Pascal with extensions to the proposed Ansi/IEEE 1981 standard. The Pascal compiler license, which includes a runtime license, is available for \$6,000. The Pascal runtime libraries license is available for \$1,000.

Stratus Computer is located at 17-19 Strathmore Road, Natick, Mass. 01760.

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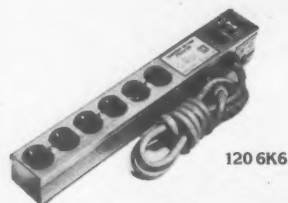
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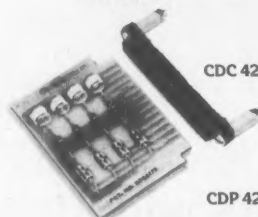
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Dylakor Boosts 'DYL-260,' 'DOC'

GRANADA HILLS, Calif. — Dylakor, Inc. has announced enhancements to its DYL-260 report writer/utility and its DYL-DOC utility, which is used in conjunction with DYL-260.

Release 7.1 of DYL-260 is available for IBM and plug-compatible mainframes. Its error analysis capabilities reportedly have been expanded to include data name analysis. This is intended to inspect the fields involved in a data exception Abend and prints only the contents of the field in error, plus its data name or attributes.

In addition, a new end-of-file tag and improved file identification methods have been added to make DYL-260 easier to use. Release 7.1 will be shipped free of charge to all current DYL-260 customers. Otherwise, the software is priced at \$1,680/year on a three-year lease, the vendor said.

Release 3.1 of DYL-DOC also will be shipped free of charge to current DYL-DOC customers. It is used in conjunction with DYL-260 to provide an English language narrative of fixed-format DYL-260 program parameters.

The updated version reportedly recognizes the data name analysis feature in Release 7.1 of DYL-260, as well as IBM 3375 and 3380 disk drives, which now are supported by DYL-260.

Dylakor is located at 17418 Chatsworth St., P.O. Box 3010, Granada Hills, Calif. 91344.

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DEC PDP-11 Users Get Series of Software Packages

WAYLAND, Mass. — A series of packages for use on Digital Equipment Corp. PDP-11 systems are now available from EEC Systems, Inc.

They include Accounts-11M, described as a supplement to the basic multiuser accounting supplied by the RSX-11M operating system. The package allows RSX installations to determine what demands are being placed on the system and whether they are met, according to the vendor. Accounts-11M costs \$1,595 for a license under the RSX operating system.

The LEX-11 word processing software package has been implemented for the IAS operating system running on the PDP-11. The price for

LEX-11 ranges from \$2,500 to \$7,000. Catch-23 runs on Version 3.2 RSX-11M. The end-user license price is \$995.

Dache 11M is a memory disk cache software package for PDP-11 users. Price for a single-CPU license is \$1,250.

Wizdisc-11M, for use under the RSX-11M S operating system for accessing main memory as a "disk device," is priced at \$995 for a license under the RSX operating system.

Multidisc11M, for the RSX-11M S, Price for license is \$995 available under RSX operating system.

The software packages are available from EEC Systems, 286 Boston Post Road, Wayland, Mass. 01778.

'Genius' Report Generator Now Fits CDC, Univac

AUSTIN, Texas — Intel Corp.'s Systems Group announced that its Genius conversational report generator, which runs with its System 2000 data base management system, is now available for Control Data Corp. computers and Sperry Univac 1100 and 1100/60 hardware. Genius was previously available for IBM OS machines only.

Genius is an adjunct to the System 2000 Report Writer, which automatically generates reports based upon the user's response during an interactive prompting session, the vendor explained.

It provides summations, calculations, intermediate values, data selec-

tion and detailed item display. It also features prompting and error detection/correction capacities to aid novice programmers, the vendor said.

This product is priced at \$10,000, Intel said from 12675 Research Blvd., P.O. Box 9968, Austin, Texas 78766.

Accounting Tools Out for VAX-11s

VIENNA, Va. — NKF Engineering associates, Inc. has announced a Cost Accounting and Accounts Payable package for interactive Digital Equipment Corp. VAX-11 processors.

The package features labor and accounts payable input, accounts payable processing of vendor lists, aging reports, hand check listing and labor rate reports, the vendor said.

The package is written in VAX Cobol and leases for \$700/mo, the vendor said from Suite 700, 8150 Leesburg Pike, Vienna, Va. 22180.

Compiler Fits DEC Systems

WAYLAND, Mass. — EEC Systems, Inc. has announced a new release of its RJ-11 Cobol Compiler for Digital Equipment Corp. LSI-11 microcomputers and PDP-11 minicomputers.

This release features time-sharing facilities that support up to six terminals running Cobol programs concurrently. Programs remain resident while they are operating so that terminal response time is fast, even with a floppy disk system, the vendor said.

Two or more terminals operating the same program require only one copy of Procedure Division to be loaded. Also, "write" and "advancing" is now allowed to access disk files, allowing print files to be written to disk and later printed, according to the vendor.

Prices for the RJ-11 Cobol Compiler start at \$2,500 from EEC Systems at 286 Boston Post Road, Wayland, Mass. 01778.

3M, Kodak Printers Link to DEC Systems

WEST BLOOMFIELD, Mich. — Radley Business Computers has introduced a software package said to allow the full line of Digital Equipment Corp. systems to interface with 3M Co. and Kodak Corp. microfilm reader/printers.

Micro-Link allows microfilm records to be retrieved by keying reference numbers into the computer, the vendor said. The operator is instructed by the computer as to which reel to mount in the microfilm reader. The reader/printer is then instructed to advance to the first frame number that contains the pertinent information.

The license agreement starts at \$4,000. Minimum hardware configuration is available for \$14,000.

Radley is located at Suite B212, 5600 W. Maple Road, West Bloomfield, Mich. 48033.

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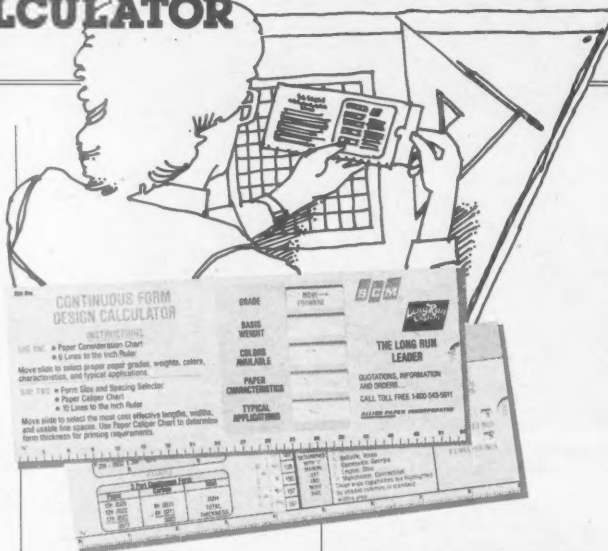
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HOS Extends Capabilities Of 'Useit'

CAMBRIDGE, Mass. — Higher Order Software, Inc. (HOS) has extended the capabilities of its Useit systems development methodology to automatically generate Pascal, in addition to Ansi-66 standard Fortran, on Digital Equipment Corp. VAX-11 machines running under VMS.

The Useit methodology is composed of three components, according to the vendor.

This includes the Axes language for interactive definition requirements. Programmers use Axes via a CRT terminal to specify requirements.

The Analyzer

The second component, the Analyzer, is used to analyze separately developed parts of the requirements definition, the vendor said.

The third component, the Resource Allocation Tool (RAT), reportedly takes the parts of the analyzed requirements definition and automatically programs from them, generating accurate source code.

A complete configuration of Useit, including one RAT, is priced at \$133,000.

HOS is located at 806 Massachusetts Ave., Cambridge, Mass. 02139.

Speech Tool Supports Orator Chip

SANTA BARBARA, Calif. — A speech-processing software package designed to support the General Instrument Corp. Orator speech synthesizer chip has been developed by Signal Technology, Inc.

The software operates on Digital Equipment Corp. VAX-11 VAX/VMS and PDP-11 RSX-11M computer systems.

The Speech Development System is composed of a subset of Signal Technology's Interactive Laboratory Systems' signal-processing package.

It reportedly contains tools for speech labeling, waveform editing and display, speech analysis and synthesis, format tracking, digital filtering and spectral analysis.

A one-time license fee costs \$12,500 (domestic) and \$14,500 (foreign) from the firm.

General Instrument Corp. is located at 15 W. De La Guerra St., Santa Barbara, Calif. 93101.

Business Graphics Package Out for DEC VAX-11 Users

WELLESLEY, Mass. — A full-color business graphics package has been developed by Cortex Corp. here for users of Digital Equipment Corp. VAX-11 superminis.

The Executive Data Display System (Edds) supports the DEC Professional microcomputers and Hewlett-Packard Co. plotters as output devices. Line plotters, scatter plots, bar charts, histograms,

pie charts and alpha signs are produced in full color using the Professional system as an intelligent graphics terminal, the vendor said. The graphics can be transferred to a variety of hard-copy forms including transparencies and slides.

Edds is priced at \$5,500, a spokeswoman at Cortex said from 55 Williams St., Wellesley, Mass. 02181.

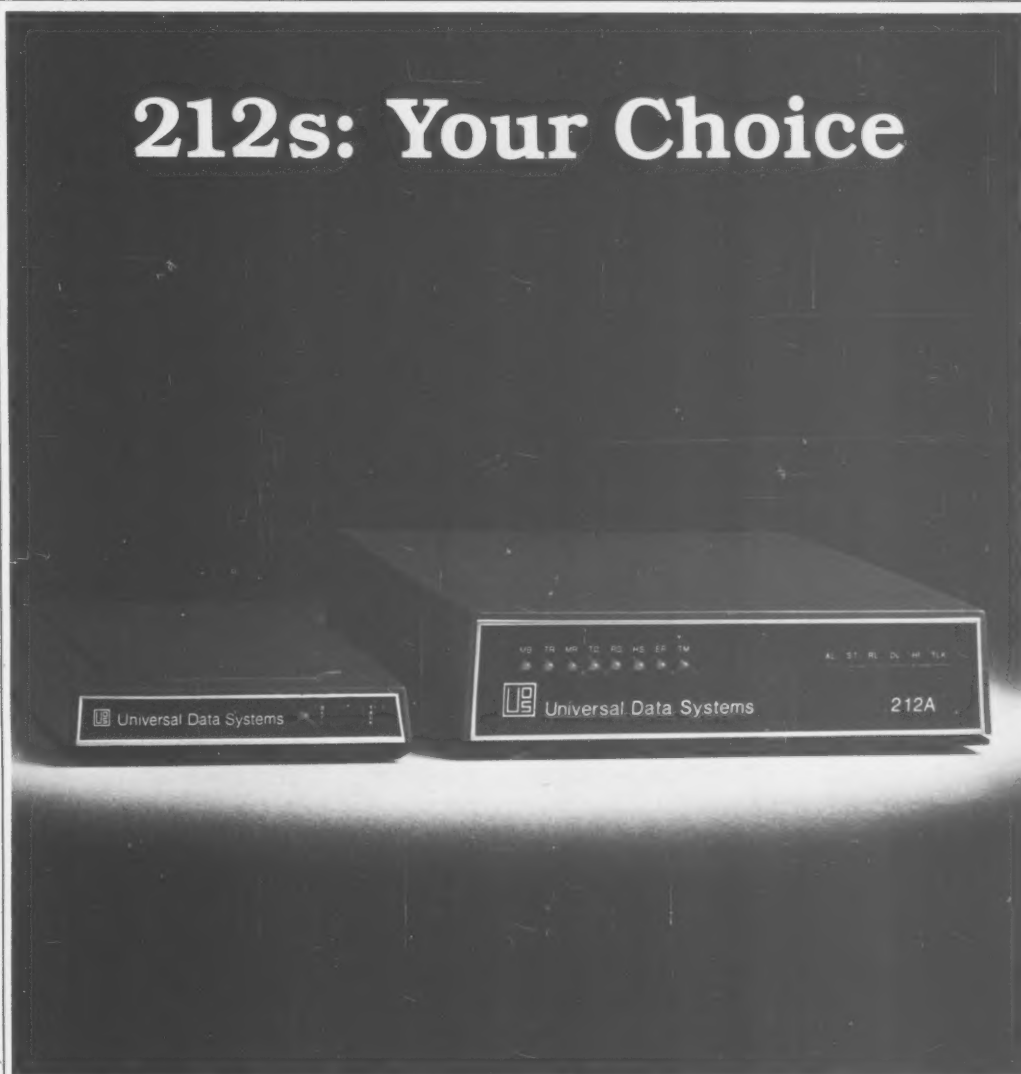
IBM 370-Era Processors Get Algorithm Simulator

HOUSTON — Houston Information Systems, Inc. has announced Ultrades, an algorithm simulator for IBM 370-era processors.

The package can be used in running benchmark tests on pipelined processors, typically IBM 3033s, the vendor explained. Written in IBM 370 assembler language, the package uses standard linking conventions and can reportedly be used for other languages that call upon assembler.

The package is available for a one-time charge of \$2,500, including a year's maintenance. The vendor is at Suite A1, 5151 Mitchelldale, Houston, Texas 77092.

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*Single unit prices.

Choice #2, \$495* — the newest addition to the UDS family of line-powered modems is the 212LP. It is Bell 212-compatible at 1200bps only (many applications never utilize the 300bps channel), is certified for direct connection to the dial-up network and requires no AC power connection. Operating energy is derived entirely from the telephone circuit.

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Created by Dayner/Hall, Inc., Winter Park, FL

KGA Package Announced For Wang 2200

CHICAGO — A marketing strategy management software package for the Wang Laboratories, Inc. 2200 has been developed by KGA Engineering, Inc.

The Sales Territory Administration and Market Planning System is said to produce stratigraphic analysis of customer activity projections and performance evaluation.

For the sales person, activity log and analysis reports can be produced showing prior sales calls and transactions, customers' previous and current sales volume, projected purchasing volumes and any special customer situations.

The software costs \$4,000 from KGA at 655 W. Irving Park Road, Chicago, Ill. 60611.

'SFD' Assists Wholesalers

CLEVELAND — A wholesale/distribution management system directed at the durable goods segment of the wholesale industry has been announced here by Creative Data Systems, Inc.

System for Distribution (SFD) — designed for users of Wang Laboratories, Inc. VS computers — is an on-line, interactive, integrated, real-time software package consisting of several modules written in Cobol. It provides multiprofit-center, multiwarehouse and multi-company processing, the vendor said. It contains order entry, invoicing, accounts receivable, inventory control, purchase order management, sales analysis, accounts payable and general ledger systems.

The complete system costs \$18,000 from Creative Data Systems at 23500 Mercantile Road, Beachwood, Ohio 44122.

Q.E.D. Offers Auto Package

MINNEAPOLIS — Q.E.D. Systems, Inc. has announced an on-line interactive Automotive Parts and Tire Distribution package for Hewlett-Packard Co. HP 3000 processors.

Features include order entry, picking list generation, inventory, open item accounting and a listing of profits by product and product category.

The package is available for a one-time licensing fee of \$27,500/installation, the vendor said from 106 Glenwood Ave., Minneapolis, Minn. 55403.

Atlantic Management Bows Basic Version of PC/70

PHILADELPHIA — Atlantic Management Systems, Inc. has introduced a basic version of its PC/70 Project Planning and Control System for the Hewlett-Packard Co. HP 3000.

Features of the package found in the full version include project planning, resource scheduling and tracking, time and cost accounting and project monitoring, the vendor said.

Also included are project chargeback, critical path analysis and budgeting and cost analysis.

The software costs \$15,000 from Atlantic Management Systems, 320 Walnut St., Philadelphia, Pa. 19106.

'On-Line Cash' Available For HP, Univac, IBM Users

SAN DIEGO — United Information Services, Inc. has announced the On-Line Cash Application software package for users of Hewlett-Packard Co. HP 3000, the Sperry Univac 1100 and System 80 and IBM equipment running under the OS/DOS and VSE operating systems.

The On-Line Cash Application offers access to data in the vendor's accounts receiv-

able system and data affecting the company's incoming cash flow. With the new system, data can be entered and validated on-line, rather than waiting for batch reports to be produced, the vendor said.

The package is available for \$6,000 from United Information Services, 6626 Convoy Court, San Diego, Calif. 92111.

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Runs on DG Computers

'Go' Eliminates Seizure of CPU

ARMONK, N.Y. — Exact Systems and Programming Corp. has introduced a software package that runs on any Data General Corp. computer and reportedly allows more than one terminal to perform different tasks.

The package, called Go, eliminates the seizure of the CPU caused by different terminals making simultaneous updates at the record level, a

spokesman for Exact Systems claimed.

Prime features of Go include context switching, integral communications control, fast response time, memory map control, automatic data base logging, roll forward reconstruction facility and networking capability, a spokesman for the company said.

Go is also available as part

of a turnkey system.

DG hardware would be provided to fit the needs of the organization, the vendor said.

The license fee for Go ranges from \$1,800 to \$10,000 depending on system configuration.

More information is available from Exact Systems and Programming, One Labriola Court, Armonk, N.Y. 10504.

'Escape,' 'Cybil' Packages Introduced for Prime

ENGLEWOOD, Colo. — An application development tool and a financial modeling package for the Prime Computer, Inc. Information Series have been introduced by Software Management Systems, Inc.

Escape is an integrated application development tool said to build screens, process transactions, generate reports and document itself

with system- and user-level documentation.

Cybil was designed for profit and loss analysis and forecasting, pricing and costing studies, cash-flow management, budgeting, market planning, sales forecasting and tax planning.

Escape costs \$35,000 and Cybil costs \$5,000 from the firm at 84 Inverness Circle E., Englewood, Colo. 80112.

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Course Aids
'DB/DC' Use

OAK BROOK, Ill. — An educational series for managers, applications programmers and analysts using IBM's DB/DC data dictionary in an IBM IMS/VS or DOS DL/1 environment is being offered by Deltak, Inc.

The Series No. 2-5XX DB/DC Data Dictionary explores dictionary concepts, facilities and contents and on-line and batch reports, the vendor explained. An understanding of DL/1 data base concepts and terminology is a prerequisite for the series.

Designed primarily for self-instruction, the series is divided into five sources that follow a text and videotape format. The courses include: Introduction to the DB/DC Data Dictionary, DB/DC Data Dictionary Contents, Batch Reports, On-Line Reports and Additional Data Dictionary Commands.

The series is available for purchase or rental through Deltak's Datavision Library Plan, the spokesman said.

Courses rent for \$50 to \$125/course/mo depending on volume. Deltak, Inc. is located at 1220 Kensington Road, Oak Brook, Ill. 60521.

Tool Organizes
System/23 Data

LOUISVILLE, Ky. — Infosystem Design Corp. has introduced the Membership Management software package for the IBM System/23 Datamaster. The menu-driven program organizes and maintains a data base.

Along with name, address, phone and account numbers, each record contains 16 parameters.

A user-established verification table permits these 16 parameters to have up to 50 different values, the vendor said. The operator may specify codes based upon individual or organizational statistics.

The package is available for \$1,800 from Infosystem Design Corp., Chrysler Building, 4229 Bardstown Road, Louisville, Ky. 40218.

'Gbac's' From RTC Systems Bows for IBM System/38

NORTH ATTLEBORO, Mass. — RTC Systems, Inc. has announced the availability of a General Business Applications Control Systems (Gbac's) package designed for users of the IBM System/38.

The Gbac's has six modules: order processing/invoicing, accounts payable, accounts receivable, general ledger, manufacturing system and purchasing system, accord-

ing to the vendor. The modules, which are independent and completely integrated, run in RPG-III in a data base environment.

The complete package is priced at \$50,000. Modules range between \$5,000 and \$20,000 each, according to the vendor.

Gbac's is available from RTC Systems, 55 Plain St., North Attleboro, Mass. 02760.

Decision Support Tool Out for NCR Minis

DAYTON, Ohio — NCR Corp. has introduced a planning and decision support tool for its I-8100, I-8200, I-8400 and I-9000 minicomputers.

The package, called Deskcalc, is a menu-driven electronic worksheet said to perform financial analysis, "what-if" simulations and file manipulations.

Input data formats are flexible and output data can be edited by users for hard-copy or visual-display presentations, the vendor said. The software is offered for a one-time license fee of \$595.

More information is available from NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479.

Tandem Gets Release 3 Of 'Control'

CEDAR KNOLLS, N.J. — Network Concepts, Inc. has announced a new release of its source maintenance and library/catalog software package for Tandem Computers, Inc. users.

Release 3 of Control reportedly saves all versions of a program or document in "little more space" than that needed for one copy, a company spokesman claimed. Control provides information on all changes made — when, why and by whom.

With Release 3 free to current users, Control carries a one-time license fee of \$8,500 from the firm at 2 Ridgedale Ave., Cedar Knolls, N.J. 07927.

'Data*Model' Fits TI's 990s

SEATTLE — Minicomputer Modeling, Inc.'s financial modeling and spreadsheet system for minicomputers is now available for Texas Instruments, Inc. 990 series machines.

Data*Model is a menu-driven system for computer-assisted, interactive financial planning, forecasting and analysis.

The software was previously available on Datapoint Corp.; Digital Equipment Corp.; Hewlett-Packard Co.; Prime Computer, Inc.; and Wang Laboratories, Inc. systems.

Permanent licenses start at \$4,000 from the firm at Suite 508, 200 W. Mercer, Seattle, Wash. 98119.

System/34 Gets Inventory Tool

WEST BLOOMFIELD, Mich. — Rand Systems Corp. has announced an inventory control package for the IBM System/34. The package is said to be comparable to the IBM Dmas II inventory control package.

Features of the package include order entry, shipping, purchasing, accounts receivable, accounts payable, general ledger, receiving, transfers and physical inventory, the vendor said. The system is said to promote cash flow by allowing for continual billing through month-end processing and fast order processing.

The package is available for \$10,000 plus installation and training costs on a time and material basis. More information is available from the vendor at Suite B212, 5600 W. Maple Road, West Bloomfield, Mich. 48033.

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'Etlclib' Provides Solutions For Sparse Linear Equations

ATHENS, Ga. — A software package running on Control Data Corp.'s Cyber 170 under the NOS operating system to obtain out-of-core solutions for sparse linear equations is available from the Computer Soft-

ware Management and Information Center (Cosmic) at the University of Georgia.

Etlclib, a library of subroutines, was developed for use in solving linear equations where the coefficient matrix would not be singular, a Cosmic spokesman said. Etlclib consists of two main subprograms, both featuring options to control the frequency of pivoting and to take advantage of block sparsity in the coefficient matrix.

Etlclib is priced at \$675 for the program. Documentation is available separately for \$16.

Cosmic is located at Suite 112, Barrow Hall, Athens, Ga. 30602.

Device Driver Links DI-3000 To Tektronix

BOULDER, Colo. — Precision Visuals, Inc. has developed a device driver software package designed to enable users of its DI-3000 graphics software tools to take advantage of the Tektronix, Inc. 4114 graphics terminal.

The Tektronix 4114 device driver is available for installation on all computer systems supporting Precision Visuals' software, including IBM, Digital Equipment Corp. (VAX-11 and PDP-11), Control Data Corp., Data General Corp., Hewlett-Packard Co. and Prime Computer, Inc.

The new device driver reportedly supports such 4114 capabilities as a segment data structure, picking, real-time segment dragging and highlighting. With the driver, users can take advantage of rapid throughput and low bandwidth to increase their overall system performance, the vendor claimed. They can download fonts into the device and create characters with exact hardware sizing.

Written in 1966 Ansi Fortran IV, DI-3000 is a package of 160 user-callable graphics subroutines, which offers interactive graphics capabilities such as color, three dimensionality and a graphics data structure.

A license for the Tektronix 4114 device driver is priced at \$1,000. A 25-year license for DI-3000 starts at \$8,000, the vendor said from 250 Arapahoe, Boulder, Colo. 80302.

Package Aids In Drafting

SUDBURY, Mass. — A software package designed to function as a stand-alone graphics system for computer-aided drafting and design or as an integrated module is available from Structural Programming, Inc.

The Palette package is said to run under Digital Equipment Corp. RSX or VMS operating systems on the PDP-11/23 through the VAX-11 series with Tektronix, Inc. or compatible terminals.

The package improves design through interactive two-dimensional, three-dimensional and perspective capabilities, according to the vendor.

Mnemonic commands assist designers in the transition from drawing boards to interactive graphics terminals.

Base price for the package is \$27,500. Cost varies depending on the number of workstations involved, the vendor said.

Structural Programming is located at 83 Boston Post Road, Sudbury, Mass. 01776.

'LMS' Package Targets Banks

ST. LOUIS — A decision support package for commercial bank loan operations running on IBM and Burroughs Corp. medium-size and large systems has been developed by Computrol, Inc.

The Loan Management System (LMS) has three main functions: credit review and analysis, portfolio analysis and loan administration. LMS is said to cut loan losses by measuring performance history and credit worthiness of commercial accounts.

The software costs \$60,000 from Computrol, which is headquartered at 10820 Sunset Office Drive, St. Louis, Mo. 63127.

Retail Software Runs On DPS-6

SAN JOSE, Calif. — Western Business Computers, Inc. has introduced the Western Retail Accounting Package, a data collection and data processing system for retailers. The package runs on the Honeywell, Inc. DPS-6 minicomputer.

The package is said to offer sales auditing, inventory, accounts receivable and sales analysis capability. Its sales audit subsystem provides verification that data has been properly collected and input into the computer, the vendor said. It also provides an audit trail for all transactions for each store and weekly recap totals.

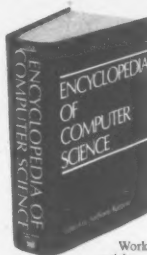
The package is available for \$20,000 from the vendor at Suite 220, 2025 Gateway Place, San Jose, Calif. 95110.

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Micromotion, Inc. has announced a process control high-resolution graphics package for Apple Computer, Inc. and Northstar Computers, Inc. processors. Called **Forth-79 Version 2**, the package provides an interactive program development environment for Apple II, Apple II+ and North Star Advantage processors. The package costs between \$99.95 and \$189.90, depending on options and processor, the vendor said from Suite 506, 12077 Wilshire Blvd., Los Angeles, Calif. 90025.

Quantekna Research Corp. has introduced a relational data management package for microcomputers using the Digital Research, Inc. operating system, CP/M. The **Quad** can be used to develop applications such as a mailing list or an inventory control system, the vendor said. The package is available for \$495 from the vendor at 6902 220th Southwest, Mountlake Terrace, Wash. 98043.

Radio Shack, a division of Tandy Corp., now offers **Model III Fortran** for its TRS-80 Model III microcomputer. The package includes an editor, compiler, linker and subroutine library on a 5 1/4-in. floppy diskette. The package is available for about \$100 at Radio Shack Computer Centers. More information can be obtained by contacting the vendor at 1800 One Tandy Center, Fort Worth, Texas 76102.

Jobstream, a software package introduced by Anton International, Inc., was designed to allow data communications on the Radio Shack TRS-80 Model II. The level-one version requires 64K bytes of random-access memory (RAM); level two requires 96K bytes of RAM. Level one costs \$179, and level two costs \$235. They are available from the vendor

Micronotes

at 260 Brooklyn Ave., San Jose, Calif. 95128.

A price reduction has been announced for the Codata Systems Corp. operating system, **Unisis**. The software is the vendor's version of the Bell Laboratories Unix operating system for its Multibus microcomputer. The original cost of \$1,500 for the first user and \$300 for each additional user has been reduced to \$1,200 for up to eight users, the vendor said. More information is available from the vendor at 285 N. Wolfe Road, Sunnyvale, Calif. 94086.

John Parnell & Associates, Inc. is offering the **Consumer Finance** office management program for the Radio Shack TRS-80 microcomputer. The menu-driven program is said to calculate and print disclosure statements, ledger cards, insurance policies, checks and other necessary documents. The \$12,500 license fee includes operational customizing, state law compliance, on-site training and one-year software warranty. It is available from the vendor at 4435 Veterans Blvd., Metairie, La. 70002.

Sperry Univac has announced a Digital Research, Inc. CP/M operating system option for its UTS 40 terminals. This product was developed to provide office personnel computing power, together with the intelligent multifunctional remote capabilities of the UTS 40 terminals. The CP/M option will provide 64K of random-access memory to execute a wide variety of applications available from Univac. The CP/M operating system costs \$250, according to the vendor who is located at P.O. Box 500, Blue Bell, Pa. 19424.

Quik-N-Easi Version 1.4 has been made available by Standard Microsystems, Inc. Version 1.4 features a report writer, dimensioned variables and color graphics, in addition to the existing applications development functions of the former package, which combined formatted edited screens, processing, file handling and printing. Quik-N-Easi runs under the Digital Research, Inc. CP/M operating system, on most Zilog, Inc. Z80-based computers and on the Radio Shack TRS-80 III without CP/M, the vendor said. One floppy disk and 48K of random-access memory are the minimum machine requirements. The package costs \$395, according to Standard Microsystems at 136 Granite Hill Court, Langhorne, Pa. 19047.

A program generator for the IBM Personal Computer and Apple Computer, Inc.'s Apple II personal computer has been announced by Advanced Operating Systems. Through a series of menus the user can define what functions he wants his program to perform. The **Programmer** uses these selections to write lines of Basic code that execute those specific functions. The end result is a program stored on disk that can also be copied onto other disks, according to the vendor. For the IBM Personal Computer, it comes with 64K of random-access memory (RAM), Monochrome Display, Monochrome Display/Printer Card, two disk drives and IBM DOS with Advanced Basic. The Apple version requires Apple II with Microsoft Corp. Z80 card, 80-col card and 48K of RAM. This product is available for \$495 from Advanced Operating Systems at 450 St. John Road, Michigan City, Ind. 46360.

Questionnaire Service Co. has released a statistical package based on the SPSS, Inc.'s SPSS language said to run on Radio Shack's TRS-80 Model II and North Star Computers, Inc. microcomputer systems. SP-Micro requires Digital Research, Inc.'s CP/M and Basic2 language. A

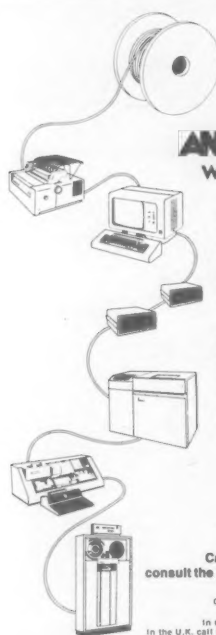
minimum of 48K bytes of memory is recommended, along with two disk drives. The product has variable and value labels, long variable names missing values and English error messages. SP-Micro is priced at \$250, including the manual. The vendor is located at P.O. Box 23056, Lansing, Mich. 48909.

Elliam Associates, Inc.'s **UNE2** program will recover erased Digital Research, Inc.'s CP/M files. A companion program, **CON2**, gives the status of the erased files that are using the same disk space as active files. Both packages cost \$75 total plus \$1.50 for shipping and handling from 24000 Bessemer St., Woodland Hills, Calif. 91367.

Telecompute Integrated Systems, Inc. has announced its **TIS-APL**

Software System for Microcomputers (SS/M) for developing such applications as accounting, financial management, property management, network communications and word processing. Designed for Intertec Data Systems, Inc.'s Superbrain, Radio Shack's TRS-80 Model II, North Star Computers, Inc.'s Horizon and Advantage and IBM's Personal Computer, the software costs \$495 without support and \$1,195 with support. The firm is located at 251 Spadina Ave., Toronto, Ont., Canada M5T 2E2.

Software Innovations, Inc. has developed a **Conversation Control System** for the IBM Personal Computer. The package acts as an intelligent interface, passing input and output from the screen and keyboard back and forth to an applications program. The introductory price, until Sept. 30, is \$220, a \$75 savings. Prior to June 30, the software costs \$195 from the firm at 5505 Blair Oaks, Box 74815, Lewisville, Texas 75056.



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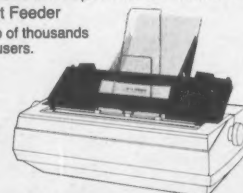
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The Imsai Computer Division of the Fischer-Freitas Corp. has released a 60K Digital Research, Inc. CP/M modification kit compatible with all Imsai Disk I/O systems, including Video Data Processors and Personal Computer Systems. The complete kit costs \$225, \$175 for the operating system or \$75 for the upgrade kit without CP/M from the firm at 910 81st Ave., Building 14, Oakland, Calif. 94621.

United Software Co. has unveiled its **Total Management/Marketing Planning (TMMP)** system designed for multiuser computers. Now available are the **TMMP/Manager**, a data base management package, and the **TMMP/Calc**, a spreadsheet calculator and report writer. Versions are currently available on the single-user Canon USA CX-1 and Smoke Signal Broadcasting, Inc. Chieftain series computers. Prices for the TMMP/Manager start at \$349.95; prices for the TMMP/Calc start at \$249.95 from 1701 E. Kellogg, Wichita, Kan. 67211.

The Information People, Inc. has released Version 3 of **The Organizer**, a front-end driver/menu generator for microcomputers using the Digital Research, Inc. CP/M and now, the MP/M operating systems. The software is said to permit untrained operators control over the functions of those operating systems. Menus and command sequences are created as text files, and screen formatting is automatic, the vendor said. It is available for \$195 from the vendor at 435 Hudson Ave., Newark, Ohio 43055.

Televideo Systems, Inc. has introduced version two of its **Multitasking, Multiprocessor, Operating System Technology** operating system for its TS/806 and TS/816 business computers. The enhancement is said to improve throughput so that files can be more quickly created, renamed, manipulated or deleted. It is available for \$200 from the vendor at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Compugraphic Corp. released **CP/M 86**, an operating system that is compatible with Digital Research, Inc.'s CP/M operating system. It is intended to make the company's Modular Composition System compatible with a range of business software. Compugraphic also released **Wordstar**, **Spellstar** and **Mailmerge** software, the first in a series of CP/M-compatible Compugraphic programs. The operating system costs \$500 and the software packages cost \$600, \$350 and \$250, respectively, the vendor said from 200 Ballardvale St., Wilmington, Mass. 01887.

Condor Computer Corp. announced that its Series 20 microcomputer software is now available for the IBM Personal Computer, in addition to Zilog, Inc. Z80 based machines. The Condor I is file management that is upgradable and sells for \$295. The Condor III is a relational data base system with indexing capabilities and a report writer. This package costs \$995, Condor said from Suite 320, 3001 W. Big Beaver Road, Troy, Mich. 48064.

Macrop is a macroprocessor for microcomputers running IBM PC-DOS or Digital Research, Inc. CP/M and CP/M-86, developed by the Pluto Research Group. This product converts simple assemblies into macro assemblies, according to the vendor, adds long variable names, compile-time expression evaluation, conditional compilation and time and date stamping of source programs. Macrop is distributed on 5¼-in. diskette for the IBM Personal Computer and for CP/M and CP/M-86 systems on 8-in. single-density diskettes. All versions of the product are priced at \$135, and the company is based at P.O. Box 50444, Palo Alto, Calif. 94303-0444.

Altos Computer Systems announced the availability of Digital

Research, Inc.'s **MP/M II Version 2.1** for use with the Altos 8-bit microcomputer. This release of the MP/M multiuser, multitasking operating systems allows CP/M application programs to run in a multiuser environment, the company said. It costs \$500, Altos said from 2360 Bering Drive, San Jose, Calif. 95131.

Microrim, a relational data base system that grew out of the Relational Information Management (RIM) data base used on National Aeronautics and Space Administration space shuttle projects, has been released here by Microrim, Inc. This

Micronotes

product offers data base management systems capabilities to systems operating under CP/M for 8-bit Intel Corp. 8080/8085 and Zilog, Inc. Z80 microprocessors. It is priced in a range of \$595 to \$1,295, depending on option, according to the vendor, which can be reached through P.O. Box 585, Bellevue, Wash. 98009.

Micronexus is a software package introduced by Datanexus, Inc. which is said to allow the Digital Equipment Corp. PDP-11 and VAX-11 minicomputer systems to use microcomputer software. The package resides on the host computer and makes minicomputers compatible

with microcomputer software, allowing the user to run a wider range of software, according to the vendor. The package sells for \$850 from the vendor at 3760 S. Highland Drive, Salt Lake City, Utah 84106.

A **Screen Copy Facility** for the Xerox Corp. 860 IPS word processing system has been introduced by Caprock Systems, Inc. The package is said to allow the user to employ one keystroke to print the current screen image on the printer. The software license is priced at \$50, available from the vendor at P.O. Box 13814, Arlington, Texas 76013.

Westico, Inc. has announced that its **Microgant** project planning system for the IBM Personal Computer is now available for microcomputers compatible with Digital Research, Inc.'s CP/M operating system. Microgant costs \$395 for the system and documentation, while documentation alone is \$25 from the firm at 25 Van Zant St., Norwalk, Conn. 06855.

An intelligent terminal emulator for microcomputers based on Digital Research, Inc.'s CP/M operating system is available from Shared Systems Technologies, Inc. The **Advanced Communications Emulator (ACE)** carries a single CPU license fee of \$150. The firm is located at Rt. 7 South, Box 1073, Bennington, Vt. 05201.

SCIENCE/SCOPE

Computers are being called upon to help create the "super chips" that will give military electronics system a tenfold increase in data processing capability. Hughes is using computer-aided design programs to develop Very High Speed Integrated Circuits (VHSIC) and the systems in which these chips will be used. Computer help is essential because of the tremendous amount of circuitry per unit area. VHSIC chips are as complex as 100 Los Angeles street maps printed on a thumb tack, and they themselves are mere components of larger, more complex systems. Computer programs will help engineers design, lay out, and test a chip. They describe an entire system (a signal processor, for example) at many different levels of detail simultaneously to predict the system's performance under various operating conditions.

Better and timelier weather forecasts will be possible when a microwave sensor is launched aboard a military satellite in the mid-1980s. The instrument will tell how hard rain is falling in a specific area rather than simply how much has fallen over a wide area within 24 hours. It also will determine wind speed, atmospheric water content, soil moisture, and sea ice conditions. Because the satellite will follow a low polar orbit, the sensor will gather important data on the little-studied polar regions and oceans. Hughes will soon deliver the prototype Special Sensor Microwave/Imager to the U.S. Air Force.

Intelsat VI will become the world's most sophisticated commercial communications satellite upon launch in 1986. The drum-shaped, spin-stabilized satellite will have twice the capacity of Intelsat V. It will be able to carry 33,000 telephone calls and four TV channels simultaneously. It will weigh more than 8200 pounds at launch, measure 12 feet in diameter, and deploy to 39 feet in height. Hughes heads an international team building Intelsat VI spacecraft for the International Telecommunications Satellite Organization.

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'Adlibrt' Supports Basic, Fortran for PDP-11 Unibus

WOBURN, Mass. — Adac Corp. has announced that its Adlibrt data acquisition and control subroutine library now supports Basic and Fortran with its analog I/O boards for the Digital Equipment Corp. PDP-11 Unibus systems.

Formerly, Adlibrt was used with Adac's DEC LSI-11 bus interfaces operating under DEC's RT-11 environment.

The I/O boards supported include three 12-bit high-level input, analog-to-digital (A/D) converters and a 12-bit four-channel digital-to-analog output converter, the vendor said.

The supported A/D converters are the 100 KHz Model 600/11AD and 35

KHz Model 635/11AD, which are input protected to +15 volts, and the 20 KHz Model 635/11AL with protection to +40 volts and special filtering to minimize noise interference, the vendor explained.

The Adlibrt Software Library, which features 15 callable subroutines, is available on floppy diskette, hard disk or tape cartridge media complete with user manual and both source and object codes for \$395 from Adac at 70 Tower Office Park, Woburn, Mass. 01801.

System/34 Gets Job Scheduler

CAPE GIRARDEAU, Mo. — An automatic job control scheduler for the IBM System/34 has been released here by Data Trans-Formation, Inc.

The Cruise Control Job Scheduler reportedly allows users to schedule any job that can evoke or run from the job queue to be run automatically at an assigned time and frequency. Each job to be scheduled by Cruise Control is described by using a data entry screen, and users can specify scheduling for every day of the week, specific days of the week or month or any other frequency needed.

The package also allows the System/34 to execute jobs seven days a week, 24 hours a day, according to the vendor.

The price of the Cruise Control package is \$465, according to Data Trans-Formation, which can be reached through P.O. Box 1541, Cape Girardeau, Mo. 63701.

'Disc/34' Fits IBM System/34

LIVONIA, Mich. — An automotive/shipping/invoice package running under IBM's System 34 is available from Washers, Inc.

The Disc/34 package interfaces internally with IBM's enhanced automotive release control software and externally with IBM's inventory accounts receivable and general ledger modules, the vendor said.

The package allows entries from multiple workstations either local or remote, on a single or multiple plant basis, according to the vendor.

The complete package with documentation and enhancements necessary for IBM's Release Control Software is priced at \$7,500 with a perpetual license. Washers is located at 33375 Glendale, Livonia, Mich. 48150.

Restaurant Tool Out

ROCHESTER, N.Y. — Genesisystems, Inc. has announced a restaurant management information system for users of Wang Laboratories, Inc. CPUs.

Features include accounts payable, payroll, inventory control, recipe control and sales analysis modules.

The package costs from \$4,000, the vendor said from 1672 Monroe Ave., Rochester, N.Y. 14618.

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Rolm Exec Argues for PBX Over Local Nets With Coax

By Phil Hirsch

CW Washington Bureau

TORONTO — Voice/data private branch exchanges (PBX) are a better bargain than coaxial cable-based local-area networks for most automated office applications, according to Janice Carnes, office systems manager for Rolm Corp. in Santa Clara, Calif. The incremental cost of adding data communications capability to an existing PBX installation is generally much less than installing a local-area network, she explained, since the wiring for the former system is already in place.

Carnes was one of several representatives of voice/data PBX manufacturers who spoke here recently at a seminar sponsored by ICA Telemanagement, a Canadian consulting firm. Her key

point was that PBX networks, despite some limitations, come closer to satisfying the total requirements of the automated office than any other system.

A major requirement, she explained, is reliability. During the next several years, data terminals are going to become as ubiquitous in many offices as the telephone is today, and data networks will have to be as reliable as telephone nets. PBX systems, unlike local-area networks, utilize multiple message paths, and although there is only one switch, virtually all of its components are replicated, Carnes pointed out.

PBX interfaces are also standardized to a much greater extent, she added, pointing out that they permit communication among 80% to 90% of today's

(Continued on Page 49)

Hyperbus Handles Data at 10M Bit/Sec

MINNEAPOLIS — Network Systems Corp. has unveiled a networking product that reportedly extends high-performance digital networking to the users of RS-232 and IBM 3270 terminals, computer-aided design and manufacturing (CAD/CAM) systems and minicomputer and microcomputer subsystems and process control equipment.

Hyperbus is a multidrop coaxial cable system that transmits data at speeds up to 10M bit/sec. It permits equipment connected to the network to operate at its rated speeds through the use of the technology employed in the vendor's high-speed computer-to-computer networking product, Hyperchannel.

The Hyperbus system was designed for multivendor equipment utilizing various protocols and permits differing applications to simultaneously utilize a common network on a peer-to-peer basis. The product will interconnect existing computer and terminal equipment within laboratory, factory and office environments and requires no hardware or software modifications by users.

Hyperbus is media-independent and utilizes technologies from baseband coaxial cable to geographic satellite circuits. Through the use of common-carrier and satellite services, multiple local Hyperbus networks may be interconnected across geographic distances while maintaining high-burst data rates at individual ports and direct peer-to-peer communications.

A hierarchical bus structure allows mul-

tiples busses to be interconnected by a backbone structure, permitting the implementation of large local networks, which may include various bus media such as fiber optics and broadband cable.

Equipment is attached to the network via microprocessor-based bus interface units. The intelligence of the bus interface unit precludes the need for a central controller, the vendor said. An individual local bus is capable of connecting up to 128 bus interface units on a 2,400-ft cable. Bus interface units are plugged into a vendor-provided wall-mounted outlet, enabling users to relocate equipment and bus interface units at any time without rewiring the network, a spokesman said.

Hyperbus utilizes a hierarchical address-

ing scheme similar to that of the phone system. Dialing across the network is transparent to data protocols, the vendor said.

The bus interface units are divided into four product families: RS-232, 3270, minicomputer and communications (link) interfaces. Many of the bus interface units are multiported, providing up to four equipment interfaces.

Prices for bus interface units range from \$2,150 to \$6,950, dependent upon the specific type of equipment interfaces and the number of ports (device attachments) provided. RS-232 bus interface units will be available in October. Network Systems Corp. is located at 7600 Boone Ave. N., Brooklyn Park, Minn. 55428.

Device Handles Voice, Data Simultaneously Over Cable Pair

HAUPPAGE, N.Y. — The Coherent Communications Systems Group has unveiled a communications device that reportedly enables the simultaneous transmission of voice and full-duplex synchronous or asynchronous data service over a two-wire nonloaded cable pair.

In the asynchronous mode, the Linemate 96 Plus is totally transparent to data rates up to 9,600 bit/sec, code formats and system protocols. In the synchronous mode, an optional adapter card permits operation

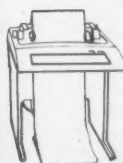
at 9,600, 7,200, 4,800 or 2,400 bit/sec, the vendor claimed.

Telephone operation is completely independent of data operation. Dialing, status of on-hook/off-hook supervision and ringing will not affect the data. The telephone will operate in the normal fashion if power to the Linemate 96 Plus is interrupted.

The device costs \$550 from Coherent at 60 Commerce Drive, Hauppauge, N.Y. 11788.

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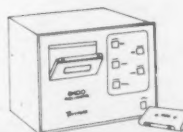
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Infotron Bows Two Data Sets

CHERRY HILL, N.J. — Infotron Systems Corp. has announced two large-scale integration data sets. The data sets have been integrated into the firm's 790 network concentrators and Supermux 480 and Supermux 680 statistical multiplexers.

The data sets can be used on a high-speed output trunk or for synchronous inputs. One data set operates at 9,600 and 4,800 bit/sec and conforms with the V.29 and V.27 standards. The other operates at 2,400 bit/sec and is compatible with the Bell 201C.

The 9,600/4,800 bit/sec model costs \$2,750. The 2,400 bit/sec unit costs \$700, the vendor said from Cherry Hill Industrial Center, Cherry Hill N.J. 08003.

Statistical Mux Introduced

CHAMPAIGN, Ill. — Compre Comm, Inc. has announced an 8-channel Economux, an asynchronous statistical multiplexer for synchronous networks operating at up to 9,600 bit/sec.

Channel groups 0 to 1 and 2 to 7 are separately controlled and may be set to either high priority for a CRT terminal or low priority for a printer. Each channel group features independent switch selection for terminal speeds of 300, 1,200, 2,400 or 4,800 bit/sec, the vendor said.

The unit costs \$1,695. The vendor can be reached through P.O. Box 3570, Champaign, Ill. 61820.

Three Modem Models Out For Micro 4000 Series

CHATSWORTH, Calif. — Microm Systems, Inc. has introduced three modem models in the 2,400 to 9,600 bit/sec range for its Micro 4000 series.

The Model 4024 is said to be a Bell 201- and V.26-compatible unit for use on four-wire point-to-point or multipoint lines. Available in synchronous and asynchronous versions, the 4024 reportedly supports fallback operation at 1,200 bit/sec. Typical price is \$795.

The Model 4048/V27 is compatible with V.27 and reportedly can be applied to two- or four-wire, full- or half-duplex operation, point-to-point or multipoint. The typical price

is \$1,750. Model 4096 measures 11-by 12-by 3 in. The 9,600 bit/sec, V.29-compatible modem features fallback operation at 7,200 or 4,800 bit/sec and is intended for point-to-point, full-duplex, four-wire operation. Typical price is \$2,695 from the firm at 20151 Nordhoff Ave., Chatsworth, Calif. 91311.

Exec Argues For PBX Nets

(Continued from Page 47)

office terminals. Carnes conceded that some applications with high transmission rates — computer-to-computer file transfer and video teleconferencing, for example — can be handled more efficiently on coaxial cable-based local networks, but she added that the bulk of today's on-line office terminals operate at speeds well within the PBX's capabilities.

Another distinctive benefit of PBX networks is that they integrate voice and data transmission, thus making possible additional applications such as electronic mail systems that accommodate voice as well as text message storage.

The keynote speaker at the seminar, Ian Angus, president of ICA Telemanagement, agreed that PBX networks have impressive economic and technical advantages compared to other types of local networks, but he thought their future use could be limited by two organizational problems — one involving suppliers, the other, users.

"The telephone industry ... has long maintained a sharp division between engineering and technical personnel [on one hand] and sales and customer-service personnel," Angus explained. "So long as a telephone was expected to do no more than transmit voice, that division was acceptable. But as telephone systems have become more complex, this division has been a source of increasing frustration to ... the potential buyer [who] finds himself faced with either a salesperson who doesn't understand technology or an engineer who seems to have no knowledge of the real needs of the business."

Within user organizations, Angus contended, a three-way battle for control of office automation is under way between office managers, telecommunications managers and data processing managers. Each has only some of the talents needed for the job, he explained. The office managers are "specialists in dealing with people but [are] generally unfamiliar with equipment beyond the photocopier ... Telecommunications managers [are] experts in managing the phone company but [have] very little clout ... but frequently have very little understanding of the real needs of management," he said.

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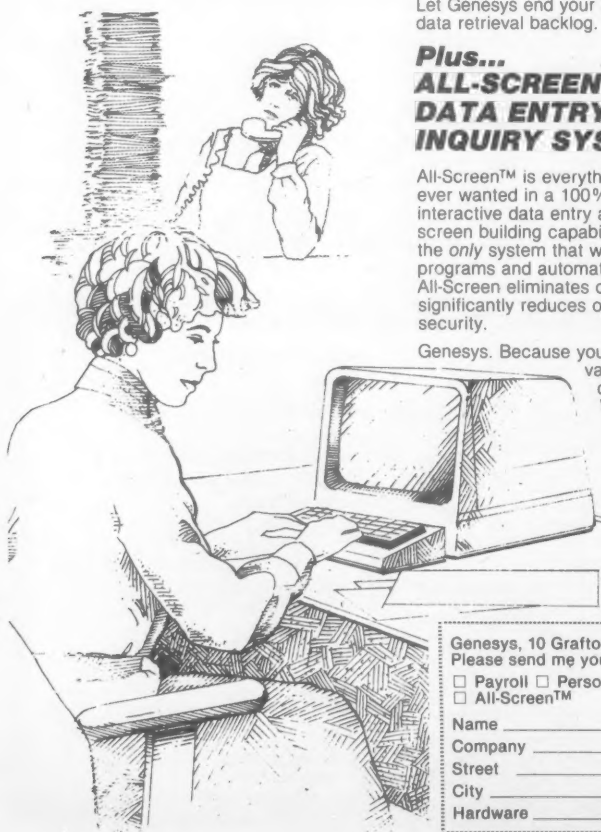
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Mux Cuts Costs With Single Coaxial Cable

SANTA CLARA, Calif. — A cable multiplexer said to reduce cabling costs by permitting up to 32 IBM 3270 terminals and related devices to

share a single coaxial cable is available from Ungermann-Bass, Inc.

The CMX series of coaxial cable multiplexers allows up

to 32 terminals in a remote location to be connected to an IBM 3274 device control unit using a single RG-62A/U cable rather than the indi-

vidual coaxial cables normally required, the vendor claimed.

The multiplexer is completely transparent to IBM user software and terminal operation, according to a spokesman for the vendor.

The Multiplexer reportedly meets all type A interface and cabling specifications.

The multiplexed link can be up to 1,500 meters long and the transmission speed is

2.3M bit/sec.

There are four versions, all of which will be available in July: The Model CMX-32 for 32 terminals costs \$4,200. The Model CMX-24 for 24 terminals costs \$3,700.

The Model CMX-16 for 16 terminals costs \$3,200 and the Model CMX-8 for eight terminals costs \$2,700. Ungermann-Bass said from 2560 Mission College Blvd., Santa Clara, Calif. 95050.

Converter Sends Data Via SNA

AUSTIN, Texas — KMW Systems Corp. has unveiled a protocol converter that reportedly sends and receives Ebcidic data via an IBM Systems Network Architecture (SNA) network using synchronous data link control protocol.

The Series II 3270 Protocol Converter performs all required error-checking functions and data translations and outputs or inputs it in serial asynchronous or byte parallel format to and from user-attached devices.

This allows operation at high telecommunications data rates on a wide variety of peripheral equipment such as CRT terminals, line

printers and card readers, the vendor claimed.

It costs \$4,250 from KMW at 8307 Highway 71 W., Austin, Texas 78735.

Unit Acts As Dial-Up, Stand-Alone

ALEXANDRIA, Va. — Term-Tronics, Inc. has unveiled an IBM-compatible 3270 terminal that will reportedly concurrently operate as a stand-alone 3276-2 and/or a dial-up ADM-3A.

The Model 3270-A/B supports both binary synchronous communications and asynchronous communications and provides full functional compatibility, the vendor claimed.

It was designed with a built-in controller and can be multidropped with up to 32 3270-A/B CRT terminals/leased circuit. For added flexibility when the terminal is not configured as a dial-up ADM-3A, its Ascii communications port may be used to support a standard asynchronous printer device using X(on)/X(off) or data terminal-ready protocols and is separately addressable.

The single-unit price is \$2,495, Term-Tronics said from Suite 305, 4660 Kenmore Ave., Alexandria, Va. 22304.

'Asynch-86' Fits Intel 8086/8088

NEWMARKET, N.H. — IE Systems, Inc. has released Asynch-86, an asynchronous communications software package for Intel Corp. 8086/8088-based computers.

This package features binary and test file transfers between mainframes, minis and micros. It also functions as an interactive terminal mode.

Asynch-86 is priced at \$495. IE Systems can be reached at Box 359, 86 Main St., Newmarket, N.H. 03857.

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Colorgraphic Unveils Color CRT Terminal

ATLANTA — Colorgraphic Communications Corp. has announced a desktop RS-232C-compatible color CRT terminal.

The MVI-100 is said to include six monochrome emulators to allow use with most application software written for standard Ascii terminals. Asynchronous protocols are used for communications between the MVI-100 and the host or modem, the vendor said. The terminal also includes the Digital Equipment Corp. VT100 line drawing graphics set as a standard along with double-high, double-wide characters.

The terminal is said to have foreground and background colors of red, green, blue, white, yellow, pink and turquoise with reverse video, underline and blink features. Color highlighting is created through use of the MVI-100 Color Enhancement Emulation.

Instructions serve to enhance current monochrome software to distinguish and relate data on user application programs. The screen does not require nonglare filters or screens, the vendor

said. The detachable keyboard contains a typewriter-style keyboard, a 12-key numeric keypad, 15 editing keys and 24 programmable function keys.

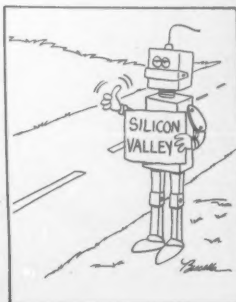
The MVI-100 is priced at \$2,750 with quantity discounts available from the vendor at Suite 105, 2379 John Glenn Drive, Atlanta, Ga. 30341.

Color Monitor Runs on IBM, Apple Micros

ARLINGTON HEIGHTS, Ill. — Amdek Corp. has introduced the Color II monitor designed for use with IBM's Personal Computer and the Apple Computer, Inc. Apple II and Apple III microcomputers.

The monitor provides 560 color dot triads and 80 by 24 character display capability. It has on/off, contrast, brightness and vertical-hold controls, the vendor reported. It is also color-channel software programmable, parallel with existing Apple text and graphics modes and features direct-coupled red/green/blue digital inputs for high line resolution.

The monitor is available for \$899 from Amdek Corp., Suite E, 2420 E. Oakton St., Arlington Heights, Ill. 60005.



Workstation Gives Full-Color Display

HUNTSVILLE, Ala. — An integrated workstation said to offer users of Digital Equipment Corp.'s LSI-11/23 processors full-color display, VT100 compatibility and limited graphics features is available from General Digital Industries, Inc. (GDI).

The Compat/23 reportedly consists of the DEC LSI-11/23 processor; 256K bytes of memory; a 10M- or 20M-byte 5¼-in. Winchester disk; one or two 8-in. double-sided, double-density floppy drives; 14-in., seven-color CRT display; VT100-compatible keyboard; and three asynchronous

ports for printer, modem or additional displays.

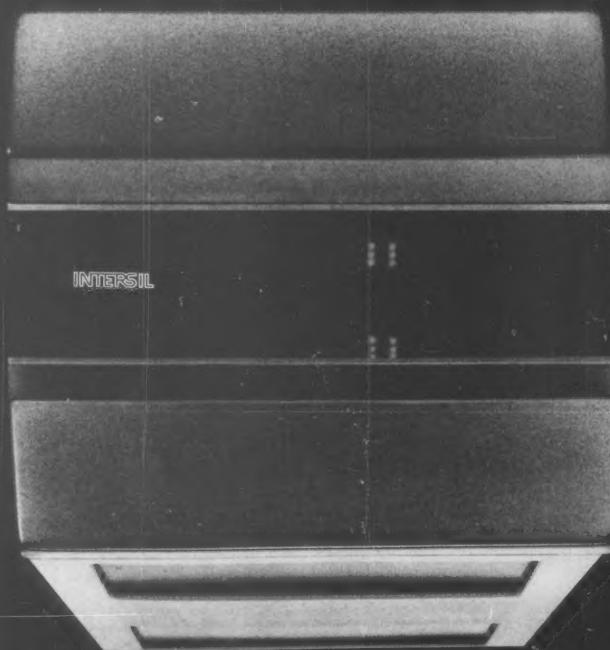
The complete Compat/23 is packaged in an aluminum tabletop cabinet.

General Digital Industries also offers a variety of software products with the Compat/23, including RT-11, RSX-11 and Xenix operating systems, a Core graphics package and a relational data base manager.

Unit price for a complete Compat/23 system is \$14,900.

General Digital Industries is based at 500 Wynn Drive, Huntsville, Ala. 35805.

There are
free
IBM 3270 terminals
hidden
in this box.*



Executive 10, Esprit II Hazeltime Releases Two Terminals

COMMACK, N.Y. — Two computer terminals called Executive 10 and Esprit II have recently been introduced here by Hazeltime Corp.

The Executive 10 is an addition to the company's Executive 80 series of smart computer terminals and offers a variety of configurations. It can perform various applications including data entry,

data inquiry and software development. It provides eight programmable function keys, a programmable 25th status line, a full set of editing features, a 7 by 10 dot matrix display, split-screen display and a business graphics character set.

This product is priced at \$1,995, according to the vendor.

The Esprit II offers standard

terminal features such as a detached keyboard and a nonglare CRT screen plus editing capabilities including character insert/delete, line insert/delete and local print. It is buffered and capable of displaying the complete 128 Ascii character set, the vendor said.

Esprit II costs \$645 from Hazeltime, which is based in Commack, N.Y. 11725.

Satellite Delay Simulator Made For Simultaneous Path Testing

SANTA BARBARA, Calif. — A satellite delay simulator (SDS) designed for simultaneous testing of transmission paths has been announced by Associated Computer Consultants.

SDS simulates delays and error conditions that occur during satellite or other long-distance transmissions, the vendor said. SDS was designed for use with any tele-

communications system that experiences delays, such as in satellite or transatlantic cable transmission.

SDS will accept input voltage ranges of 85 Vac to 130 Vac and 170 Vac to 260 Vac, according to the vendor. SDS full-duplex channels provide simultaneous testing in both directions when interposed in the transmission path.

The unit can accommodate data rates up to 1.5M bit/sec and simulate distances up to 290,000 kilometers.

SDS, priced at \$15,000, is available from Associated Computer Consultants at 228 E. Cota St., Santa Barbara, Calif. 93101.



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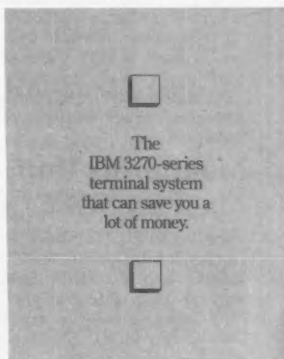
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Hinet Gets Increase In Memory

OAKLAND, Calif. — Digital Microsystems, Inc. has quadrupled the disk memory of its Hinet local-network master stations.

The stations, which can also function as stand-alone computer systems, can now support up to four 23M-byte disk drives, for a total of 92M bytes, the spokesman claimed.

Hinet is a CP/M-based packet-switched network providing 500K bit/sec serial data transmission with synchronous data link control protocol.

The network, which supports up to 32 users and can address as many as 250, utilizes a master/slave polling scheme with RS-422 electrical specifications using twisted-pair or flat-ribbon cable.

The 23M-byte System Option Multiple Hard Disks are priced at \$4,895/drive and are available immediately, the vendor said from 1840 Embarcadero, Oakland, Calif. 94606.

Data-Control Enhances Line

DANBURY, Conn. — Data-Control Systems Co. has enhanced its Random Access Modem product line.

The units can transmit high-speed digital information over ac power lines in either synchronous or asynchronous modes, the vendor said.

Up to five 9,600 bit/sec full-duplex channels are available. The units are available with RS-232 or 449 interfaces and cost \$875 for an asynchronous model and \$985 for a synchronous model.

Data-Control Systems Co. is headquartered at Commerce Drive, Danbury, Conn. 06810.

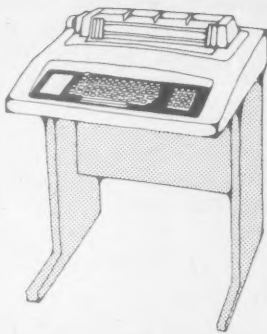
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Protocol Converter Upgraded To Resemble IBM 3278

TORRANCE, Calif. — Local Data, Inc. has upgraded its Datalynx/3270 protocol converter to give any combination of eight asynchronous terminal types operating features identical to an IBM 3278 when used with a binary synchronous communications (BSC) host.

Previously, the asynchronous Ascii terminals required the pressing of two terminal keys to generate some functions and other functions avail-

able to 3278 users were not possible from Ascii terminals.

More than 20 terminal types are now supported. The unit features buffer storage of up to 10K bytes of random-access memory and program storage up to 16K bytes of erasable programmable read-only memory. The price of Datalynx/3270 remains at \$1,950, a spokesman said from 2701 Toledo St., Torrance, Calif. 90503.

Asynchronous Multiplexers Interface to DEC Unibus

SANTA ANA, Calif. — Trendata Corp. has introduced asynchronous multiplexers with eight or 16 lines. They were designed as interfaces to any Digital Equipment Corp. PDP-11 Unibus processor or VAX-11 supermini with Unibus adapter.

The Trendata TDZ-11 is offered in

three versions. Version A consists of an 8-channel controller on a hex-size card and the cable distribution assembly with its associated cables, filter and mounting hardware. Version B consists of only the 8-channel controller card, cables and filter. Version E is an A version and B version combined to offer 16 asynchronous serial lines.

Sixteen standard transmission rates from 50 to 9,600 bit/sec are program controlled and the voltage levels and pinning conform to RS-232C and CCITT recommendation, the vendor said.

Version A is available for \$1,895, Version B for \$1,595 and Version E for \$3,095 from Trendata Corp., 3400 Segerstrom Ave., Santa Ana, Calif. 92704.

Controller Fits IBM Micro

SUNNYVALE, Calif. — An asynchronous communications controller with either one or two RS-232 ports is available from Datamac Computer Systems, Inc. for use on IBM's Personal Computer.

The controller, which is said to be compatible with IBM software, was designed for users who need multiple serial RS-232 connections such as for a printer and a modem, the vendor said. The controller allows IBM Personal Computer users to connect their terminals to IBM systems and IBM-compatible laboratory instruments and peripherals.

A programmable transmission rate generator gives users the choice of communications rates from 50 to 9,600 bit/sec. The controller runs standard IBM diagnostics that provide loopback functions for transmit/receive signals and I/O signals.

The one-line version of the controller is priced at \$139 and is priced at \$199 for the two-line version.

Datamac Computer System is at 680 Almanor Ave., Sunnyvale, Calif. 94086.

Monitoring Unit Made for SDLC/SNA

SALT LAKE CITY, Utah — Questronics, Inc. has announced the Model 500, a performance monitoring unit for users of IBM's Synchronous Data Link Control/Systems Network Architecture (SDLC/SNA) communications environment.

The Model 552 was designed to collect response-time data from all devices attached to one control unit in a multidrop, SDLC/SNA synchronous communications environment. The unit allows front-panel programming for automatic monitoring and printout of up to three statistical data sets without impacting the user's host software, the vendor said.

The package costs \$1,200, Questronics said from 3565 S. W. Temple, No. 5, Salt Lake City, Utah 84115.

Controller Runs CRT Terminals

TUCSON, Ariz. — Applied Micro Technology, Inc. has added a CRT terminal controller said to be compatible with all standard basic utility systems.

The ST4504 provides composite video, transistor-to-transistor logic, horizontal and vertical drive outputs, parallel keyboard and light pen strobe inputs, the vendor said.

The ST4504 appears as 2K bytes of random-access memory display while occupying four consecutive, strap-selectable I/O locations, the vendor said. Provisions were made for two character generators, three programmable character attributes, a programmable cursor and screen formatting for both interlaced and non-interlaced video.

Unit price for the ST4504 is \$385 with quantity discounts available.

Applied Micro Technology can be reached through P.O. Box 3042, Tucson, Ariz. 85702.



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Racal-Vadic has done it again! This time it's the world's first quad modem, and it includes the first practical 2400 bps full-duplex modem. Here's what you get in one small package:

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- 1200 bps full-duplex (Racal-Vadic VA3400 compatible)
- 1200 bps full-duplex (Bell 212A compatible)
- 300 bps full-duplex (Bell 103 compatible)

For remote-terminal users, the VA4400 is available in a compact stand-alone cabinet which can also hold a VA811 automatic dialer. Eight VA4400 quad modems can be mounted in a 7-inch-high rack-mount chassis in central computer sites.

The modem of the future is here now and you can see it at Racal-Vadic's booth 5322.



2. The VA4840 - 4800 bps Bell 208A/B Compatible modem

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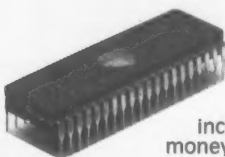
- Priced at \$1,350 in single quantity.
- It's smaller than any other 4800 bps modem and fits in a compact stand-alone cabinet for use in remote locations. Eight VA4840's can be packaged in Racal-Vadic's 7-inch-high rack-mount chassis.
- It's compatible with the VA811 automatic dialer.
- It operates on the switched network or 2/4-wire leased lines. Impressive technical features include: 50 ms equalization and synchronization for quick turnaround in multi-point applications and extensive user diagnostics, including automatic self-test.

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See the VA4840 in action at Racal-Vadic's booth 5322.



3. Incredible Shrinking Custom Modems



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- A custom Bell-type 103 300 bps full-duplex modem on a 10 square-inch PC board.

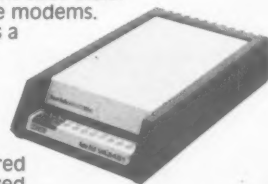
These are complete modems - FCC certified and UL approved. They have the options you've dreamed about: auto dialing with stored numbers, interactive conversation with the terminal operator, and diagnostics able to pin-point network problems.

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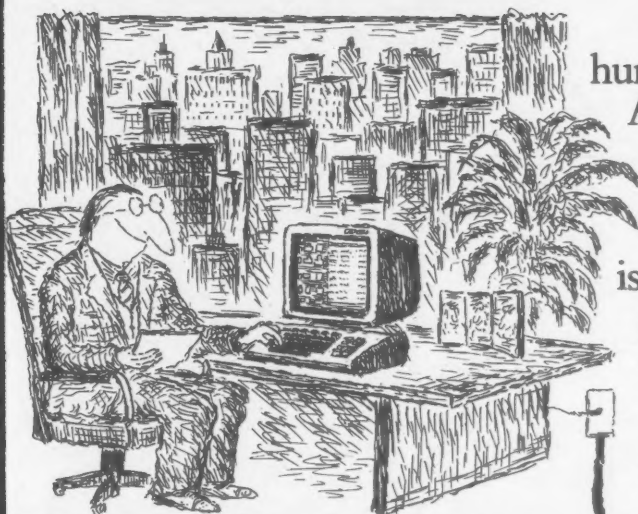
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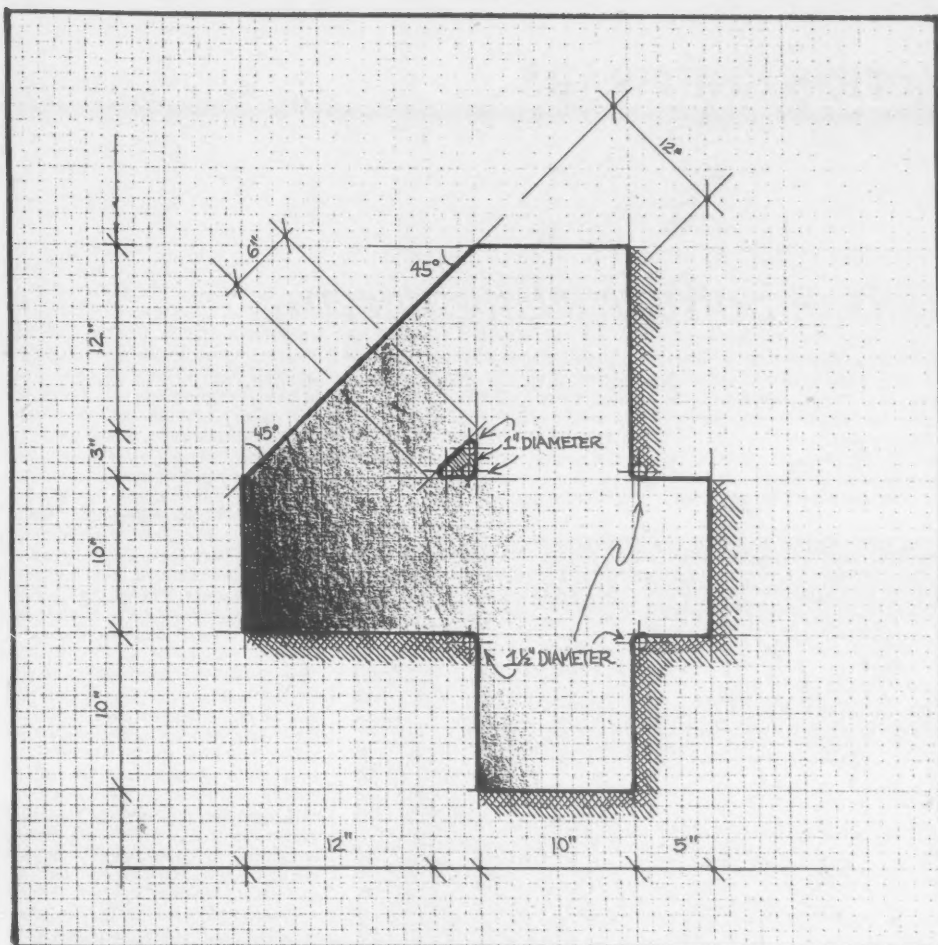
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ENGINEERING 4TH-GENERATION SYSTEM SOFTWARE BY MARTIN GOETZ

IN THE 1980s, THE GROWTH of many organizations will depend on how effectively they improve and integrate data processing in their operations. This is particularly critical for those medium-size and large organizations that have been data processing users over the last 20 years and have worked with second- and third-generation hardware and software systems.

Today, these organizations are almost completely dependent on their data processing systems and their existing applications, data, DP organization and personnel, computer languages and system and application products. At the same time, such organizations have the experience that will permit them to understand, as well as take advantage of, a new fourth generation of systems software products that can have a profound effect on how user applications are developed and maintained in the 1980s and beyond.

Most of these growing organizations have similar DP profiles and characteristics:

- They have mainframe computers — that is, IBM 370, 4300, 3300 or equivalent.
- They have developed and are maintaining many applications, usually written in Cobol.
- They have centralized DP departments and possibly even end-user programming groups.
- They have an ever-growing backlog of applications.
- They must use existing data to develop new applications as well as to operate existing applications.

Hundreds of thousands of users around the world fall into these categories. No matter what their industry or size, they all face major decisions on how to plan their long-term DP requirements.

Will new systems software packages help them satisfy their needs? Will new applications packages meet their requirements? Where will they find the trained personnel to program or maintain their applications? How can they survive if key systems personnel leave their organizations? Will the '80s see computers realize their full potential? Will the daily chaos end?

The answers to these questions are complex. In fact, they will vary radically depending on how management views these problems.

But there is light at the end of
(Continued on In Depth/3)

IN DEPTH

The Roots of Software Engineering

In 1968, the North Atlantic Treaty Organization sponsored an international conference titled "Software Engineering." A select group of senior computer scientists met to discuss the parallels between the development of large commercial and government user applications (such

as airline reservation systems, command and control systems, operating systems and complex systems software) in the context of using sound engineering principles.

The meetings focused on how to make such large development efforts more manageable. The attendees

concluded that the design, development, testing and maintenance of such systems could and should follow traditional engineering and manufacturing disciplines and that the success of such efforts is tied directly to how they are viewed by their parent organizations.

In the '70s, structured programming became the first outgrowth of software engineering principles. It was viewed as a new discipline that would increase programmer productivity and reduce maintenance cost. While many people may believe that structured programming never met these goals, it nevertheless has had a profound effect on today's languages. In fact, most new languages incorporate structured programming constructs, and the benefits of developing programs using structured techniques are widely acknowledged.

Structured programming is based on software engineering principles that isolate programs and modules into independent components or "black boxes" with clear interfaces. Each module has control structures limited to three basic types of statements: sequence statements, control statements and looping statements. Programs are constructed by organizing these statements in hierarchical fashion. Structured programming is viewed as a process of building replaceable and independent components and subcomponents that closely parallels the construction of circuitry in computer hardware.

Human Engineering

Another concept that became popular in the '70s was "human engineering." The term referred to the importance of designing programs and applications to take into account the way people think, act and react. This emphasis has become increasingly important as terminals, on-line programming and on-line applications provide more interaction between systems and people.

In his new book, *Managing the Database Environment*, James Martin uses the term "information engineering" in his discussion of how companies organize, process, control and retrieve data. Martin discusses structured analysis, structured design, organization structures, data analysis and the business model — all terms that are equated with an organized and structured approach to application development.

But how does "engineering" apply to the thousands of programs being developed by hobbyists and part-time programmers for microcomputers? Are these programs being engineered? Is engineering a buzzword?

The answers to these questions are not simple. But in view of all the "evidence," there is no longer any question that those skilled in the art of programming should be software engineers and that programs and applications, whether simple or complex, must be designed and constructed in a modular, organized way. Such programs are easier to enhance, maintain, test and debug.

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IN DEPTH

(Continued from In Depth/1)

the tunnel. A new generation of systems software products is now emerging. They will not only affect a user's decision about whether to build an application or buy a package, but will also affect the organization's ability to decide whether to develop that application with end-user departments or via a centralized DP department.

This article will explore these choices in the context of the new fourth-generation systems software product technology. We will examine the subject in four parts:

Part 1: The programming and applications development process itself. Will users' programming problems go away? What exactly is programming? Are programs written to be published or are they engineered to be part of a machine? We will explore these questions first in the context of how users should view all their DP requirements.

Part 2: The history of user-developed applications in the '70s and early '80s. We will then examine how applications should be developed using fourth-generation systems software products.

Part 3: The new and emerging facilities and capabilities of fourth-generation systems software products.

Part 4: Fourth-generation products in the context of the hundreds of applications that may already exist at a user's organization, as well as the many new applications scheduled to be developed. And finally, we will review how a DP organization can take advantage of fourth-generation systems software products.

1. The Programming Process

Programming has always been viewed as a major problem by both the hardware manufacturer and the commercial user. For the manufacturer, programming has restricted the potential market since sales are customarily based on the customer's ability to use the computer. For the user, programming an application is costly and difficult.

To deal with this problem, hardware manufacturers in the early '60s consistently underestimated the user's total programming effort and provided programming assistance to lighten the user's initial programming load. Then in the mid-to-late '60s, the user was told that new operating systems, JCL and the upward-compatible IBM 360 series would significantly reduce the programming burden.

In the '70s, manufacturers continued their promises, alluding to the possibility that new "future systems" would somehow become more intelligent and that the needed "software" would be put into hardware. The manufacturers also implied that "programmed chips" and firmware might somehow be put together to solve the programming problem.

While these hopes did not materialize in the '70s, manufacturers and us-

ers realized that a great number of user applications could be satisfied with off-the-shelf applications packages used "as is" or customized. By the same token, however, the '70s also demonstrated that most user applications could not be satisfied by standardized applications packages and that professional programmers in a DP department or end-user departments must develop the applications.

Now in the '80s, hope persists that

the programming problem will go away. We read about the personal computer and applications packages that are migrating to the office to give each user or department its own computing capability. And finally, we read about the great potential of applications packages.

Will there be hundreds of applications packages to choose from, just as there are hundreds of computer games? Will we just go to our local computer store and choose our appli-

cation requirements? Will applications packages make that "programming problem" go away?

In my opinion, it will never go away. Programming a commercial application or buying a package is a professional, technical endeavor that represents an important investment by a corporation. The application must be maintained, expanded and controlled regardless of whether it is simple or complex, developed by the DP department, by end-user depart-

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IN DEPTH

ments or purchased.

The root of the problem until now has been the inadequacy of programming tools, personnel and packages. The user has been unable to provide cost-effective, reliable applications.

The Job Itself

Before we discuss fourth-generation software products and their influence, it is important that we try to understand the programming process better.

Is a program akin to a piece of writing that involves creativity, style and grammar and in which infinite combinations of words are permissible? Or is it more like a machine — something that is engineered (or constructed), modular, tested, maintained and designed to perform a specific and defined function? The textbook definition of writing is: "The act or practice of creating and recording a literary (or musical) composition."

The definition of engineering is: "The science and art of planning, constructing and managing structures of various kinds."

I contend that a program is an extension of a computer and therefore should be treated as a machine component of a computer. Such machine components should be constructed using engineering disciplines and controls that have been proven in a traditional manufacturing environment.

The idea of "software engineering" is not new. Since its origin about 15 years ago, the term has become a recognized and accepted label for the process of program design and development (see "The Roots of Software Engineering" on In Depth/2).

Most user applications today are composed of user-developed programs, as well as systems software programs. These programs should be collectively viewed as components of a computer that are combined in a building-block fashion to form an operational user application. Now, let's look at how these user applications were built in the 1970s and how they are being built today.

2. The User Experience From the '70s to Today

History will view the 1960s as a time of chaos when many users attempted to develop complex commercial applications and failed. The

'70s and early '80s will probably be viewed as a mixed bag.

Many commercial applications in operation today were developed in the '70s. These applications exist in

the more progressive medium- to large-scale DP installations, such as airlines, banks, insurance, service and manufacturing companies throughout the world. Such applications, however, represent

a very small percentage of all applications developed during the 1970s — probably less than 5%.

Most of these surviving 1970-era applications have made extensive use of oper-

ating system facilities, systems software packages and programming tools. Without such building blocks, users learned, these installations would not have succeeded; the time, cost and overall de-

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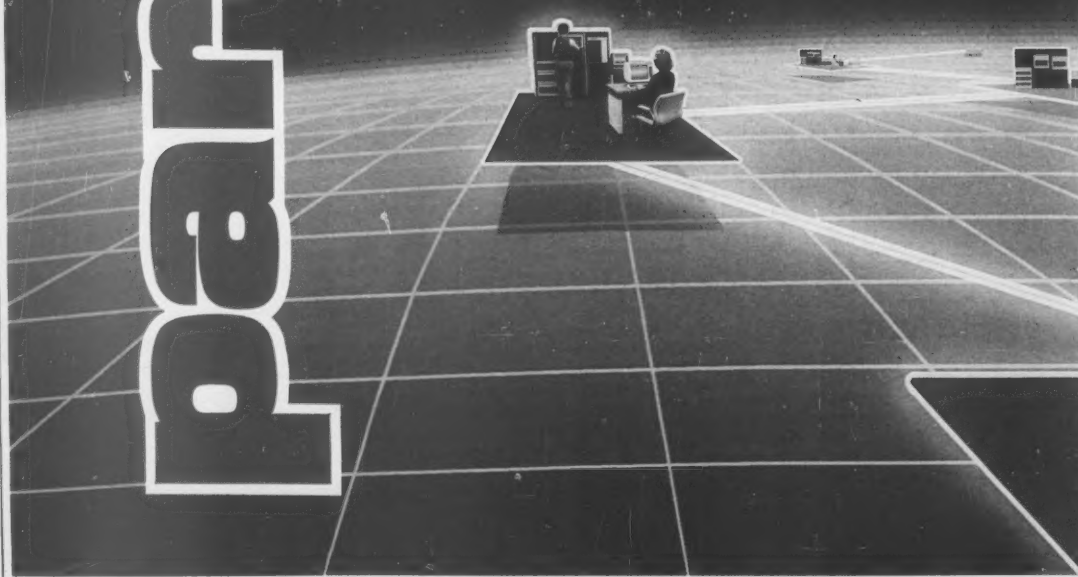
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IN DEPTH

velopment effort would have been increased significantly.

The successful developer of commercial applications in the '70s used a top-down design approach that permitted the system to be defined, val-

idated and debugged by modules.

A chief programmer, or chief architect, would oversee the entire effort much as an engineer oversees the construction of a complex

piece of machinery.

Many companies that took this approach also either used or experimented with standardized interfaces between programs, structured design, structured walk-

throughs, formalized testing procedures and programs and a host of other techniques.

However, while some of the application techniques of the '70s used these building-

block principles, they were not fully integrated. The technicians often built without adequate controls, so there were many incompatibilities among components. Even more important, the applications still did not have the corporate commitment and overall management control they should have had.

Finally, developers often did not take into account the many people within an organization that had to interact with the application and the computer. At best, many of these applications will meet "the test of time" in the '80s.

3. Capabilities And Facilities Of Fourth-Generation Systems Software

Fourth-generation systems software products offer new capabilities and have been integrated into a more complete working environment than the software of the '70s. Following is a description of the new generation's general characteristics and some of the products and facilities. Finally, two integrated fourth-generation systems are reviewed.

General Characteristics

1. *Integrated and compatible.* Fourth-generation systems software must work easily with other software products so that they appear to the user as one integrated set of products. For example, if each product provides for interaction via a terminal, there should be a common software component that controls the screen. If two products use a data base, they should be able to access the same data base at the same time without having to copy a portion of that data base. There should be a common library for each product, a common data dictionary for each product and so on. And, if different software products use the same common components, compatibility of function and language will be automatic.

2. *Use very high-level languages.* Fourth-generation software products that are language-driven should have new languages that are "higher" than Cobol and PL/I by a significant order of magnitude. These languages may be both procedural and nonprocedural and should significantly reduce the number of statements a user must develop, debug and

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FOURTH-GENERATION SOFTWARE

In Depth/6

IN DEPTH

maintain. All testing and debugging must take place at the source level; in fact, fourth-generation software should have a complete debugging subsystem designed into the language. Even more important, these very high-level languages should reduce the level of expertise required of the user.

3. *Transparent and portable.* Fourth-generation software should be able to treat data stored in various structures identically. For example, if data

is stored in Vsam files or a data base, it should be accessible by a programmer or end user in a high-level language without user knowledge of the underlying data structure.

Fourth-generation application languages should also provide for applications to be developed independently of the operating system, teleprocessing monitor and underlying software and hardware. The application language should be purely problem-oriented and not environ-

ment-dependent. This independence means that applications need not be converted when the operating systems, teleprocessing monitors or hardware components are replaced or revised.

Transparency of data storage, coupled with portability of applications between teleprocessing or operating systems, makes applications significantly easier to develop, debug and maintain.

4. *Designed with human factors in*

mind. Fourth-generation software products should be engineered to reflect the needs, frailties and skills of the people who must interact with the software. Considerations include the following:

a. Typical user errors (that is, the software must be "forgiving").

b. The way users see, process and organize information (split-screen capability, prompts, menus and help facilities).

c. The way users retrieve and display information (interactive data retrieval and reporting facilities).

Product Capabilities

1. *Central and generalized dictionary.* Fourth-generation data dictionaries should be flexible and general enough to define the status and relationships of all data processing resources of an organization, including programs, data screens, reports and people and their relationships. The dictionaries should provide for other software products and user programs to access and store data through various interfaces. Furthermore, the dictionaries must be able to be integrated not only with DBMS, but with source library systems, Cobol code generators, screen creation programs, query systems and report generators.

2. *Data administrator facilities.* The software should provide, with a central dictionary, a comprehensive set of utilities and reports so that the installation's data and programs are completely controlled and monitored by data base administrators. Thus, all end users who use such programs and data do so under the control of a central authority. While some may view this as a restriction, such separation provides a form of control and compatibility that is critical to the proper operation of a DP installation.

3. *Relational capabilities.* A user of fourth-generation systems software should not have to know how data is organized, where it is stored or how it is related to other data or programs. This capability may be inherent in the higher level programming language, in a query language or even at the "call" level. But in any case, the data is managed by the software and the end user need only know what data he wants. All data is viewed as simple two-dimensional tables or flat files.

4. *Screen creation and management facilities.* Fourth-generation software products should have facilities for easy screen mapping capabilities that are independent of the programs that use them. These facilities should provide for easy layout of screen formats, setting attributes of the screen (such as highlighting of fields, security, validation of fields, editing of fields) and a host of other capabilities. Further, such facilities should be cataloged in a screen library and defined in a dictionary indicating which programs use such screens.

The term "screen painting" has

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emerged to describe a terminal user's ability to interact with the system to construct screens, menus and editing rules. To complement the screen-creation facilities, there should be screen management services for transmitting, processing and dynamically modifying screens and for controlling screen use.

5. *Split-screen orientation.* The software should treat a terminal screen as one or more logical screens, thus providing for a screen to be split into

several viewing areas. This capability is not only important for use within one software product, but also when several programs are to display data independently to a user.

6. *Intelligent and easy-to-use editors.* Fourth-generation software should have editors that are driven by, and recognize the syntax of, the input language, thereby ensuring that only valid statements are entered. The software should allow easy insertion, deletion and manipulation of state-

ments as well as enforcement of the language's rules.

The software should prompt for proper syntax, know the "scope" of a statement when it deletes information and be quick to adapt to either the novice end-user programmer who works with menus or the experienced programmer or end user who works at the command level. Finally, the editor should provide a shorthand — for general use by the editor as well as customized use by

the user — to reduce the number of keystrokes required for input.

7. *Automated data base design.* Fourth-generation software should be able to define automatically how data should be organized in a data base to avoid the need for either data or programs to change as new applications and data uses evolve. This ap-

Four Clues For Developers

Both the successful and unsuccessful applications of the '70s and early '80s pointed up four very important characteristics, which provide clues for the developers of fourth-generation software and applications.

- **Most commercial applications should have very long lives.** Applications represent the policies, DP requirements, practices and strategy of an organization. Second- and third-generation applications have remained active within corporations for as long as 10 to 15 years. Properly developed fourth-generation applications should have a life span of 20 years or more.

- **Applications are very volatile.** They are continually enhanced, modified and converted, either because of rapid technological advances or changes in the organization's processing requirements resulting from growth, corporate revisions and new government regulations. Applications in the '80s will be even more volatile as hardware and software technology and user requirements continue to change at an accelerating rate.

- **Many major applications were conceived by a key designer or developed by a chief programmer.** These key staffers were often the only ones who could maintain the application. Many '70s applications did not remain viable because there were no long-term design specifications, documentation was not kept up to date, the original programming team left or the application was not constructed in a modular, top-down fashion. Applications in the '80s should be engineered so that they are independent of the original development team.

- **Applications maintenance is the Achilles' heel of many companies.** Maintenance often represents 60% to 80% of a company's DP efforts. Early in the '70s, users identified the "maintenance iceberg" — that partially hidden but enormous amount of time that in-house personnel had to spend on existing applications. Maintenance for many installations today has risen to 80% of costs. Others have experienced a decrease to between 30% and 40%, attributable to the use of DBMS, data dictionaries, precompilers and high-level languages. Fourth-generation software products will reduce maintenance to as low as 20% to 30% in the '80s.

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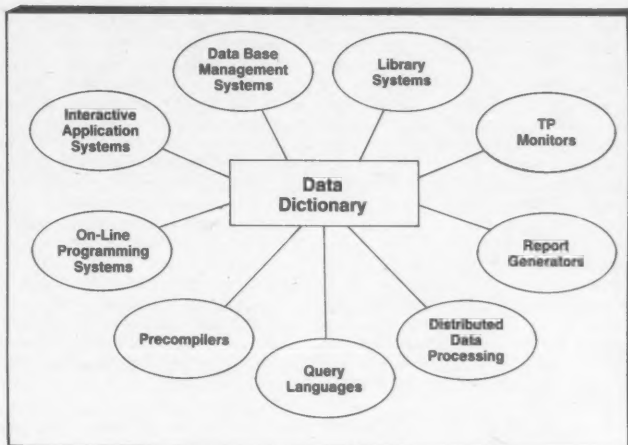


Figure 1

proach is known as putting data in "third normal form." Data in this form is not subject to change as new applications use the same data. To develop such stable data structures, a user must attempt to analyze as much of his future data processing requirements as possible and to develop "user views" of his applications data usage.

8. *Support of design and development methodologies.* Structured design and program methodologies should be supported automatically. This support should be part of new design and development languages that not only help in the overall applications development cycle but also provide a formal means of communication and documentation among all the various personnel that interact during the life cycle of an application.

9. *Complete program auditing.* Although it is easy to change program statements at a terminal, fourth-generation software should provide a complete audit of all changes made to programs and program modules. There must be facilities that date stamp every change to a program, keep a complete history of changes and permit any program to be reconstructed if need be. In other words, complete control of terminal source program activity must be maintained.

10. *More secure data and systems.* Fourth-generation software should provide for increased security in the operating system, greater use of encryption techniques and use of special passwords and keys.

11. *Distributed data processing.* Fourth-generation systems should provide for data to be dispersed for local processing while also being accessible throughout a network. Such systems bridge the gap between different operating systems, enable complete sharing of data across multiple data centers and provide for interactive access to data from any site in the network.

12. *Merging of text, word and data processing.* Fourth-generation software should provide for natural lan-

guage text and word processing to be integrated into data management systems so that structured and unstructured data will operate together harmoniously. This will result in the merging of electronic mail, word processing systems and other specialized systems sharing the same hardware and software.

13. *Integrated graphics management.* Fourth-generation software should integrate existing graphics capabilities with higher level languages, reporting systems and query systems. Color terminals and special end-user printers will require output to be displayed in a variety of ways.

14. *Integrated decision support systems.* Fourth-generation software should see the integration of decision support software with DBMS, data dictionaries and other systems. "What-if" questions concerning changes to data in a data base or a dictionary will be processed by such systems.

Integrated Products

Following are two examples of integrated fourth-generation products that are based on other fourth-generation software products or components. Use of these two products will be reviewed in the next section.

• *Cobol program-generation systems.* This type of product provides Cobol code generator facilities that minimize the number of statements a user codes in his program. Software products like these can accept input from data dictionaries. They provide for bringing the Cobol language to a higher level through a generalized macro facility. They also have facilities for defining and painting screens and include high-level languages for structured programming, data base access or telecommunications commands.

Their facilities enable the definition of reports for source-level debugging and for test data generation. Cobol program generation systems also offer facilities for upgrading and maintaining Cobol programs. Such systems provide an improved envi-

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IN DEPTH

ronment for developing Cobol applications and maintaining them. They are, however, limited because they are dependent on the Cobol language and Cobol compilers.

• *Interactive application development systems.* This type of fourth-generation system provides a complete integrated environment for applications development. The environment includes high-level languages, libraries, editors, testing facilities, utility functions, data dictionaries, data

base, data communications and reports — all neatly, logically and securely tied together. Also, most such systems include their own execution and debugging facilities. These types of systems are just beginning to evolve.

4. Successful Applications Of the '80s and '90s

Most growing organizations face an accelerating number of new applica-

tion requirements. Some are major applications that must be developed by the DP department and are central to the organization. Others are smaller and could conceivably be developed by end-user departments. There are also continuous requests for information and ad hoc reports for data. Often such information is required within hours or days.

At the same time, users have to maintain, as well as enhance, existing applications — most of which probably are written in Cobol. In many cases, both new and old applications will use the same data. The planning for a new application that uses fourth-generation software can have a profound effect on existing applications.

Fourth-generation data dictionaries can help bridge the gap, as well as bring the old application up to a new level (see Figure 1 on In Depth/9). Just as source program library systems were the key to effective control of programs in the '70s, the data dictionary is the added control that is needed in the '80s.

A data dictionary is a basic requirement for an installation, whether or not it has a DBMS. A data dictionary is the one software product that is central to success in the DP organization. It is needed to document, control, monitor and upgrade data and programs so that they can be more easily maintained. A data dictionary is the heart of fourth-generation software products. It is needed to control and audit the development of applications as they are programmed throughout an organization.

The dictionary ties everything together. Therefore, all programs should normally be under its control — or, at the very least, the dictionary should contain information about every programming activity within the organization.

For the Cobol environment, a variety of program generators and pre-compilers are available. Many of

these systems had their roots in the '70s, but they have been expanded to interface with data bases and teleprocessing monitors and to work with a data dictionary. They now operate interactively on-line and have become more user-friendly. That is, they are now able to be used by less experienced personnel.

Such systems can also be used while maintaining and enhancing existing Cobol applications. Further, they introduce personnel to the concept of data dictionaries and interactive programming while still leaving them in a Cobol environment. High-level Cobol languages that include structured programming concepts can also be introduced.

Cobol generator systems can act as both the technical bridge and the emotional bridge as fourth-generation programming concepts are brought into the organization. Cobol precompilers also help introduce the concepts of data base administrator, data ownership and data control.

As previously mentioned, many of the characteristics of fourth-generation software systems can be found in a new type of software product called interactive application development systems. These systems use interactive facilities and higher level languages that are both procedural and nonprocedural. They provide a complete environment for applications development (see Figure 2). They usually have provisions for accessing data from Vsam files, from a data base or from traditional files. In addition, they contain interactive facilities to produce reports and to define data entry screens.

Interactive application development systems provide productivity gains of 5 to 1 or 10 to 1 over older technologies. When they can fit into the DP environment, they should be used without hesitation.

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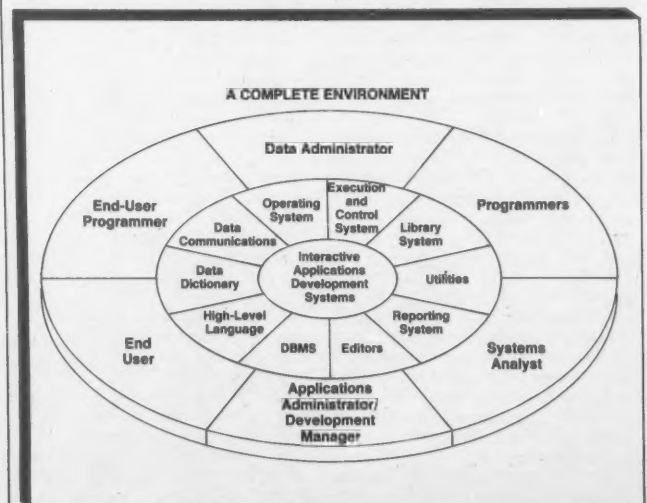
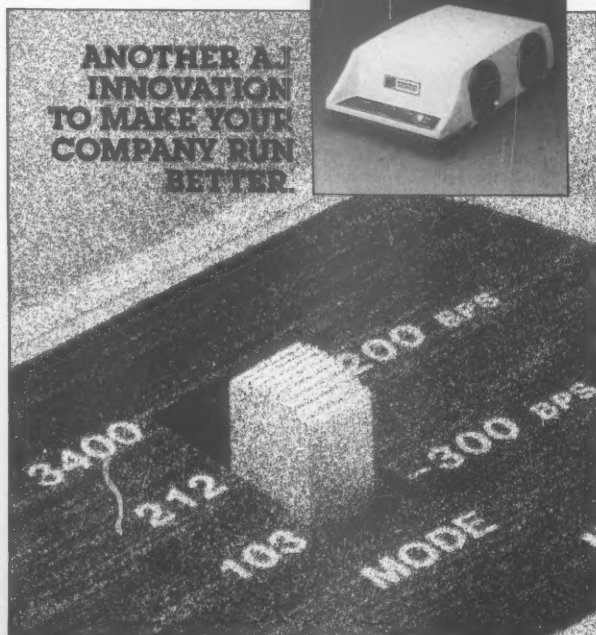
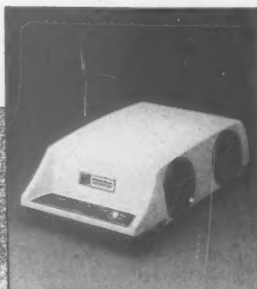
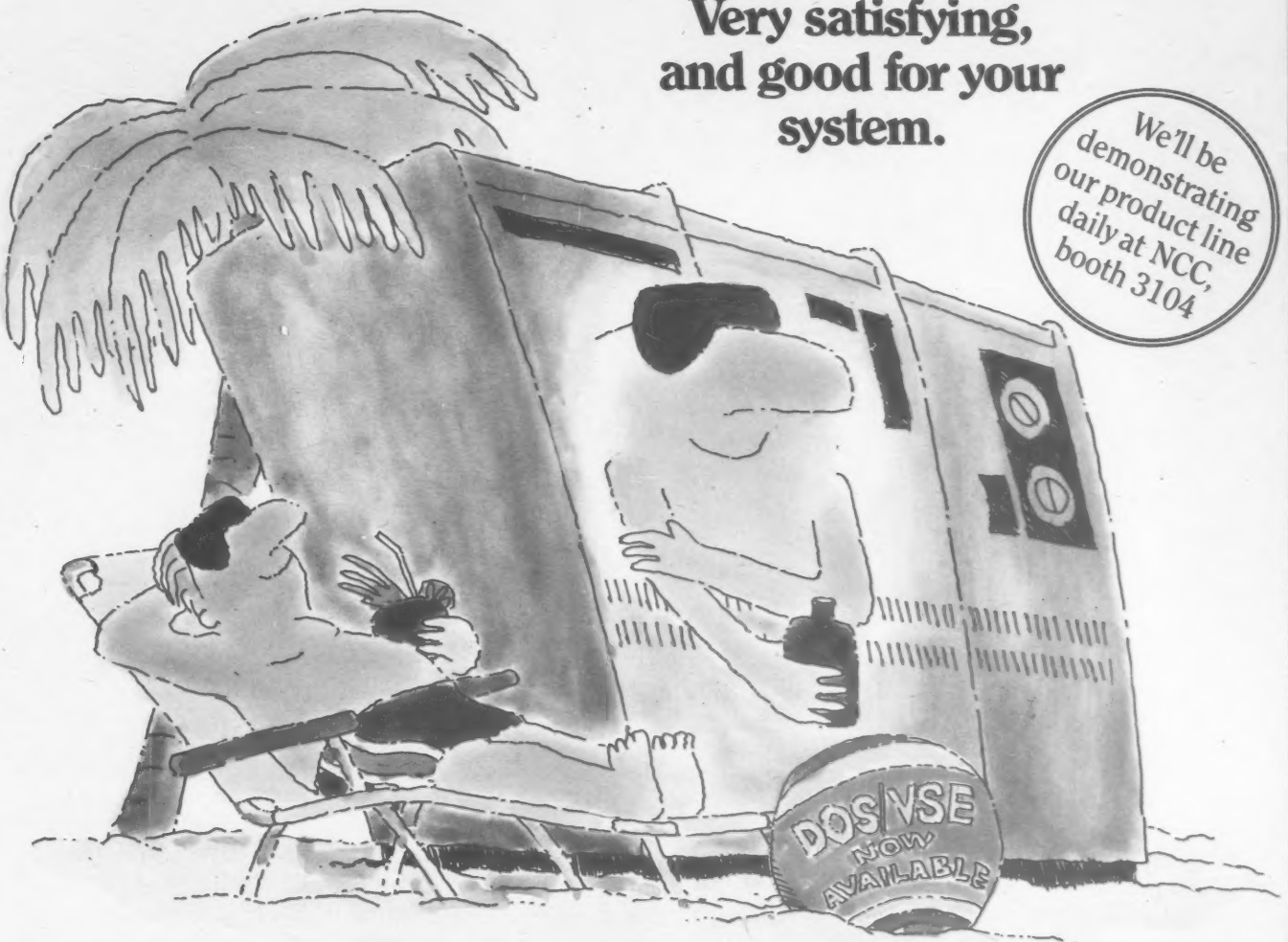


Figure 2

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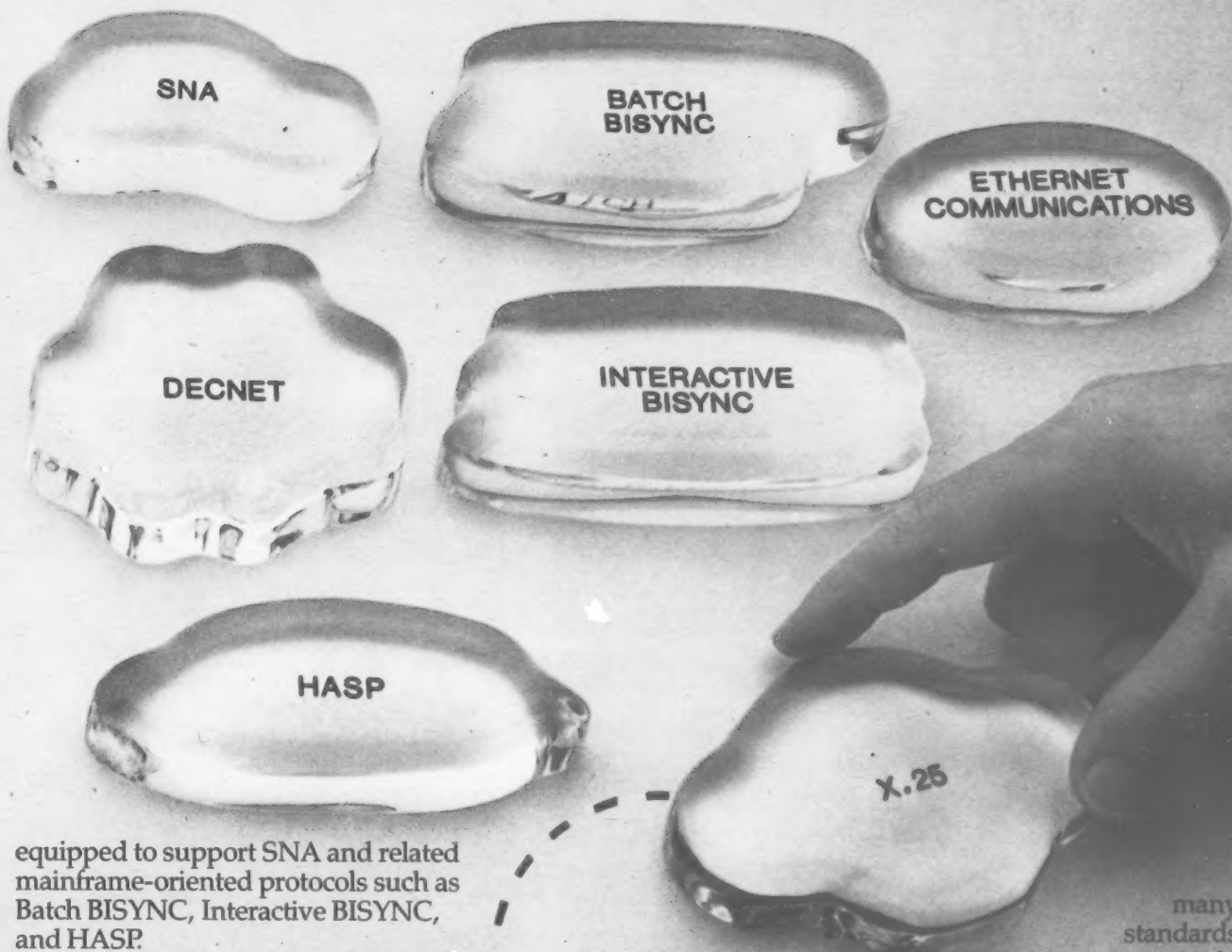
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IN DEPTH

proved software product of the '70s provide all the tools needed to develop successful applications and reduce the application backlog significantly. So what remains as the challenge?

People and management remain the chief problem. As Pogo stated, "We have met the enemy and they are us." The enemy, for many, is a combination of poor technical training, lack of leadership at the top management level, strong resistance

to change and short-term fire fighting instead of long-term planning.

Certainly, better programming tools are still to come. But there is more technology and methodology available today than is needed to make quantum leaps toward increasing programmer productivity, improving applications reliability and providing more flexibility for developing, maintaining and enhancing advanced applications.

The missing ingredients are per-

sonnel trained in using these tools and top management understanding of the long-term implications of short-term goals. Unfortunately, top DP management in most organizations has neither the clout nor the resources to change the organization's programming structure.

Need for Commitment

The answer lies in organizations committing themselves to take the following steps:

1. *Massive training and retraining of personnel.* While some computer science graduates are trained in structured methodologies and the use of new programming tools and languages, it is management's responsibility to allocate the time and resources for in-depth, in-house training.

2. *Increased use of operational systems software in advanced applications.* The operational systems software products of the '70s and early '80s should be used as the building blocks for advanced applications. Many of these systems have proven to be reliable, efficient and easy to use.

3. *Recognition that programming is more of a science than an art.* Advanced applications must be built in a professional environment and with professional programmers. They must be completely documented and built to be enhanced. Development and maintenance personnel must be treated as professional engineers and required to use structured programming techniques, top-down programming and other methodologies to ensure more reliable applications.

4. *Use of higher level languages and systems.* Program generators to augment Cobol or interactive applications development systems can reduce the time required to develop and maintain applications and improve programmer productivity.

5. *Use and investigation of programming tools.* Programming tools will not only reduce the cost of developing and maintaining applications, but will also improve their overall reliability and effectiveness. Hundreds of cost-effective programming tools are available.

6. *Close analysis of the "make vs. buy" decision.* With significant gains in productivity, it may be more cost-effective to develop an application than to purchase a package and modify it. Options must be examined carefully in light of how the application will fit into the overall computer environment.

In conclusion, we must realize that the proper operation, design, quality and reliability of commercial applications will be the very heart of many corporations' viability, growth and profitability in this decade. Therefore it is critical that management take the necessary steps to improve the DP environment.

About the Author

Martin A. Goetz is senior vice-president and director of the Software Products Division of Applied Data Research, Inc. in Princeton, N.J. He was one of the company's principal founders.

Goetz holds the first U.S. software patent and has been an active proponent of software protection. A speaker and writer, he coauthored *High Level Cobol Programming*, published in 1977 by Little Brown & Co., Boston.

Goetz holds bachelor's and master's degrees in business administration from the City College of New York.

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IN DEPTH

MAKING SENSE OF DES

BY MICHAEL SCHWARTZ

This article explains, in straightforward terms, how unadulterated DES works and what it does to information. It serves as a natural prelude to the author's companion article on when and where to use DES and how to manage it properly — to appear in the In Depth section on June 21.

DES — the Data Encryption Standard — is an *encryption algorithm*. This is a rule or recipe that scrambles information so that it is impossible to read. Obviously, the assumption is that the information is of considerable value. You are attempting to negate any loss should the information inadvertently or illegally fall into the wrong hands.

Of course, this scrambling cannot really produce useless drivel. If it did, you wouldn't be able to read it again yourself. The process must work backward. In encryption terminology, the algorithm must be *invertible*.

All encryption systems have a *key* that controls the restoration of this apparent information refuse back to its intelligible form. It personalizes the *decryption* of information.

DES is the offspring of a temporary marriage between IBM and the federal government in the early '70s. The algorithm made its official debut in the Federal Information Processing Standards Publication (Fips) No. 46, Jan. 15, 1977. DES has a couple of acronym aliases: DEA (Data Encryption Algorithm) and NBSDES (National Bureau of Standards DES).

Why use DES? Two reasons. First, data protection has become increasingly necessary. And second, DES is now ubiquitous; it is the only encryption system in the public domain that

has the U.S. government's seal of approval.

Data security is obviously of great importance. Information is now wealth, and it is becoming currency itself. In the world of industrial espionage, the new bank robbers work with bits and bytes instead of guns. Information must be protected. Steel vaults, keys and time locks guarded the old currency; something else must protect the new.

To date, DES is the only standard for encrypting information. Think of it. Security administrators throughout the country, in business and government, are all going to secure their information with the same kind of lock. Is this prudent? Is it fair? It's difficult to say.

As members of a competitive, ever-changing DP community, we have all had reasonable choices of procedures that perform familiar tasks: methods of data base access, compilers, communications methodologies and so. One of the reasons this variety exists is because these basic concepts of data access, program translation and communications are readily understandable. They deal in ready-to-be-understood DP concepts.

But the art of cryptology is alien. Having "choices" wouldn't make much sense. Those who have honestly attempted to investigate the work-

MAKING SENSE OF DES

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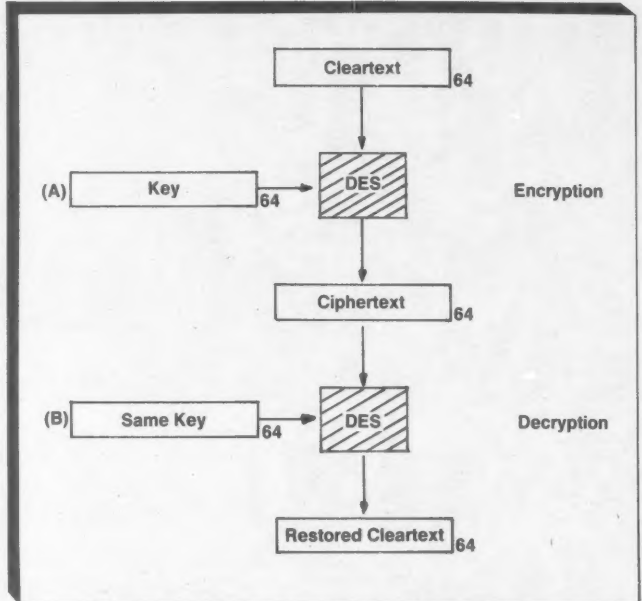


Figure 1. A DES Encryption and Decryption

ings of DES are often stopped dead in their tracks by inadequately explained diagrams consisting of mazes of arrows and splashes of mathematical hieroglyphics. This, I suppose, is no one's fault. Encryption, to some degree, is based in higher mathematics, and mathematicians have their own way of saying things succinctly (to each other).

Like it or not, we are going to use DES extensively. You don't have to understand every little detail, just enough so you don't get irregular

heart rhythms when the memo arrives directing you to implement DES software all over your already overloaded computer system.

DES Behavior

DES can be explained through two routes: from the outside in and the inside out. We will look first at DES from the outside as a black box. How does it behave? What does it take to make it work? Are there any restrictions in its use?

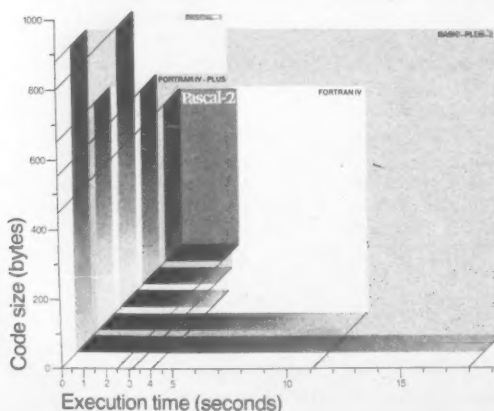
Figure 1A shows an encryption of a 64-bit (8-byte) length of information. Into the "meat grinder" black box go 64 bits. Within the black box these 64 bits get tossed, tumbled and trounced. Injected during this mixing process (coming from the left) is a 64-bit key. It too gets thrown into this mathematical melee. Finally, after some time, out falls another 64-bit segment.

Now for a little encryption terminology. The readable 64 bits that went into DES are called *cleartext*. This means that the data is readable to you and the world. After DES encryption has done its job, the result is 64 bits of *ciphertext*. It makes no sense to anyone unless he has the unique 64-bit key that got mixed up in the encryption process.

The process can be reversed as shown in Figure 1B. Take the ciphertext and put it into the same DES algorithm (as with the cleartext before) using the same 64-bit key. The nonsense becomes sense — the ciphertext is *decrypted*. Use a different key and you will get garbage as meaningless as the ciphertext. This is where DES really performs its function. Only the true key restores the encrypted information. A key that differs from the true key by even a single bit will give you nothing. The

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IN DEPTH

supposedly restored cleartext will in no way resemble the true information.

Ideally, there should be no way to "converge" on a successful decryption by trial-and-error convergence on the true key. In other words, you cannot decrypt 8 of the ciphertext bits just because you have guessed 8 bits of the key. This means there must be a lot of bit-wise voodoo going on inside that black box.

Similarly, if you change a single bit of ciphertext, then attempt a decryption with the true key, you get nothing related to the true cleartext. More evidence of bit magic in the black box.

Everything seems to work in 64-bit segments. The input to DES is 64 bits, the output is 64 bits and so is the key. Well, certainly we can understand why the input data length is equal to the output. It is nice to get a one-for-one replacement of cleartext by ciphertext. But this block length can be a little restrictive. If the data stream you wish to encrypt is not a multiple of 64 bits, you have to pad it to the required length or perform some other trick that has the same effect.

But why 64 bits? There are two reasons. First, 64 is a nice power of 2 and computers and their human associates find it convenient to work in powers of 2. The second reason: Because someone said so. The decision was made in the inner sanctums of the government. This has been a sore point to some academic cryptographers (designers of encryption systems), but we won't go into that here. The important point is that DES has a block length of 64 bits. It *encrypts* (meaning encrypts or decrypts) in 64-bit chunks. And, in its basic ECB (Electronic Code Book) form, every 64-bit segment in a data stream is encrypted independently of its 64-bit neighbor.

We also note that we use the same key to encrypt as decrypt and we can consider DES unchanged and independent of whether we are encrypting or decrypting. That classifies DES as a "symmetric" algorithm. "Public key" encryption systems, on the other hand, use a different key to decrypt than was used to encrypt and are called "asymmetric" algorithms.

One final observation from the black box viewpoint: The key is also 64 bits long. But this is something of a scam. The 64-bit key is not really 64 bits in action. That is, only 56 bits of the key are actually involved in DES. Every eighth bit is "dead." The reasons need not concern us now. The important point is that there are 2^{56} possible keys. Those of you who like big numbers may feast your eyes on this winner: 72,057,594,037,927,936. This is the number of different ways to encrypt any number of 64-bit blocks of data.

From the Inside Out

Now that we have seen DES from its "behavioral" aspect — from the outside in — it's time to take a look at

what makes the clock tick. The best way is to build DES from its remarkably simple pieces. Two of the three pieces are, in a sense, little encryption systems themselves. None of them are secure when viewed from the cryptanalytic viewpoint (cryptanalysis is the science of breaking ciphers).

DES is, in a sense, an example of the whole being greater than the sum of its parts. DES relies on the brute force of repetition — not the elegance

of its pieces — to make it secure.

DES is comprised of three basic building-block processes (the "quarks" of block ciphers): The exclusive OR (XOR), the permutation (P) box and the substitution (S) box. These are little "meat grinders" unto themselves. Each is a process that may be applied to a bit pattern. A block of bits enters each process; a transformed bit block leaves each.

Whoever discovered the XOR operation

must have been at least a little delighted, especially when its cryptological ramifications came to light. It's a simple operation, like addition and subtraction, except it is limited to the realm of binary arithmetic. It is one of the most basic computer operation codes and is found in virtually every assembler language.

To XOR two bit streams, you first line them up, one on top of the other (it doesn't matter which is on top). Then you compare each of the



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| | | |
|-----|----------|---------------|
| (A) | 01000001 | Ascii 'A' |
| (+) | 01101101 | 8 Random Bits |
| | 11010011 | Result |
| (B) | 11010011 | Result |
| (+) | 01101101 | 8 Random Bits |
| | 01000001 | Ascii 'A' |

Figure 2. The Exclusive OR

aligned bits. If they are the same, the result is 1; if they are different, the result is 0. For terminology lovers, this is called "bit-by-bit addition modulo 2."

Figure 2A shows the XOR of the 8-bit Ascii code for "A" against a random 8-bit pattern. The output of this XOR is called "Result." Obviously, Result is unchanged if "A" is on the top or the bottom. Note: Result appears to be as random as the 8 random bits. It is. Now here is the cryptographic magic of the XOR. Take Result from 2A and XOR it against the same 8-bit pattern — out pops the Ascii "A." This is shown in Figure 2B.

It's like seeing something come from nothing. If you were presented with only Result and asked to say something coherent about it, you

could only say it is random bits. And you would be right. But, bring in the 8 random bits from 2A, then do the XOR and something meaningful is produced: the Ascii code for "A."

We have just created an encryption system. It has nice qualities. The ciphertext is a one-for-one replacement of the cleartext. It requires a key (the 8 random bits) of exactly the same number of bits as the message to be encrypted. The total number of possible keys in this simple system is 2^8 or 256.

This little crypton system shares three characteristics with DES. First, it uses the same key for encrypting and decrypting, that is, it is symmetrical. Second, the same algorithm (XOR) is used to encrypt and decrypt. This makes it invertible. Third, it works in blocks of bits. When two bit blocks are XORed against each other, they must be the same length.

These three characteristics are in some ways directly responsible for the symmetry, invertibility and fixed-block nature of DES itself. (As an aside, this "little" cipher is called the Vernam or One-Time Pad. It is the only *absolutely unbreakable* cipher known to humankind. At this very moment, the world's major powers

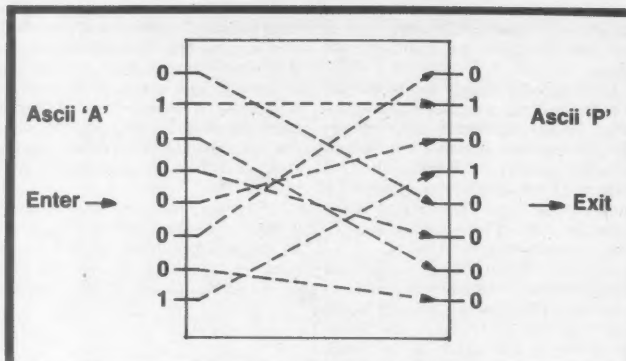


Figure 3. A P (Permutation) Box

are using the Vernam to protect their most sensitive communications.)

Diffusion and Confusion

Before describing the P and S boxes, it is necessary to mention the work of Claude E. Shannon. In 1949 he published a paper that was crucial to the development of modern automated cryptology. Among the many ideas he presented were the concepts of "diffusion" and "confusion." Definitions of these concepts are elaborate

and a bit circular in their semantics. These are not strict mathematical concepts; they are ideas much more easily understood through examples.

In DES, P boxes diffuse data and S boxes confuse data.

The P Box

Picture a three-dimensional box with eight holes on one side and eight on the opposite side. Connecting these holes are eight passageways. The choice of passageways be-

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tween holes is random and there is no combining of passages or looping back.

Let's tag mice, mongooses (or, if the box is big enough, cryptanalysts) with the numbers 1 through 8 and shove them, one in each opening, into the holes on one side of the box. We will do this in an orderly fashion; No. 1 goes into the top hole, No. 2 into the next and so on.

Out they tumble from the other side in *permuted* order depending on the design of the paths within the box. So, in went 1, 2, 3... 8 and out came, say, 5, 2, 7, 6, 3, 1, 8, 4. We have discovered and mapped the box's passage-ways. (Make sure to separate the cryptanalysts immediately after this procedure as they are aggressive and may harm one another.)

This permutation is shown in a more bland two-dimensional representation in Figure 3. The above test has established the mapping of paths from one end of the box to the other. Now we can get into the real world a bit. Now we see the P box as a crossover network of wires leading from one eight-terminal connection to another. This time, instead of tagged beings, we transmit the ASCII code for "A" (01000001) through the box. Out the other side comes the sequence 01010000. The bit signals have been permuted according to the wires' fixed design, and the input of ASCII "A" produces an output ASCII "P."

The bits have been mixed or "diffused" and, interestingly enough, we have created another cryptosystem. Where's the key? It is the pattern of the wires. Is the same key used to encrypt and decrypt? In a sense. In order to decrypt a bit pattern, you have to turn the box around. Obviously, if you place ciphertext "P" into the same end of the box as you placed the plaintext ASCII "A," you won't get "A" back out. So, given this slight hassle, this cryptosystem is indeed invertible. And there is a definite block length: 8 bits.

Comparison With XOR

This encryption system, though, does not blossom into perfection like the Vernam cipher. The permutation of bits is a more simplistic operation than the XOR. Take a glance back at Figure 2A. When we encrypted ASCII "A," Result lost all possible relationship to "A" be-

cause there was intervention of a random nature.

XORing with a random pattern causes the loss of some of the most basic properties of the cleartext. First, the total number of set bits was not

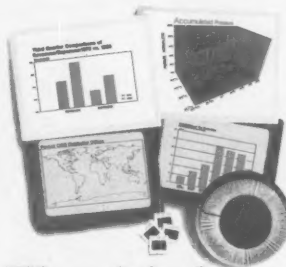
conserved. "A" had two set bits and Result had five. Therefore, there was no conservation of quantity. Furthermore, the *parity* (whether or not the total number of 1s is odd or even) was not

conserved. The parity of 01000001 is 0 (even parity) and that of 11010011 is 1 (odd).

Bit permutation via the P box is not so thorough. The result of our permutation

was 01010000. Quantity and parity were both conserved. These characteristics are dead giveaways to the cryptanalyst. Too much information about the cleartext lingers through a P box to make

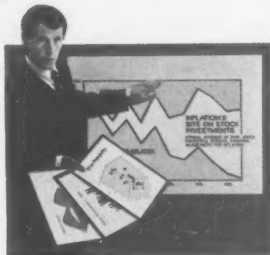
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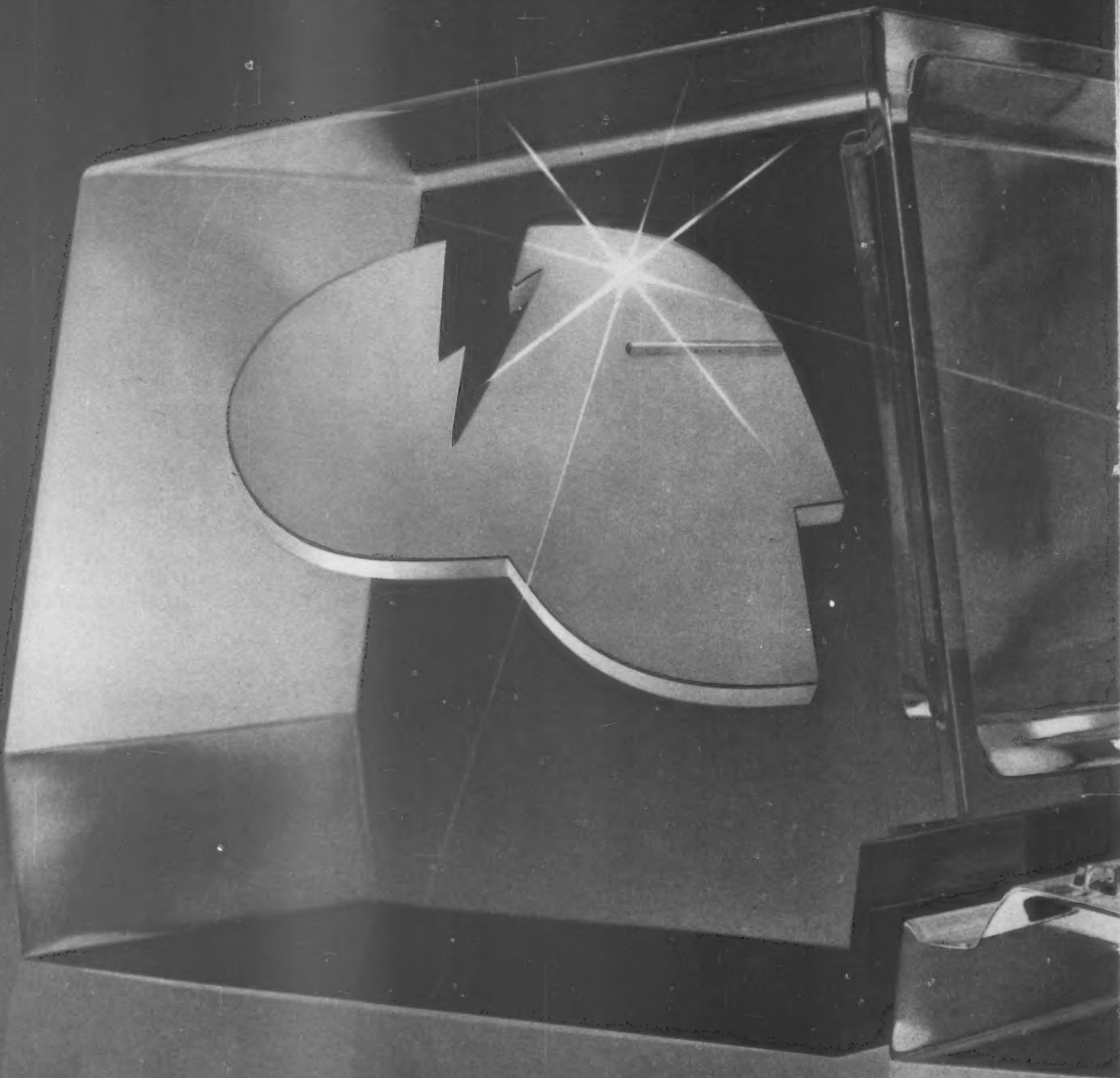


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|---------|------------|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 0 | 14 | 4 | 13 | 1 | 2 | 15 | 11 | 8 | 3 | 10 | 6 | 12 | 5 | 9 | 0 | 7 |
| 1 | 0 | 15 | 7 | 4 | 14 | 2 | 13 | 1 | 10 | 6 | 12 | 11 | 9 | 5 | 3 | 8 |
| 2 | 4 | 1 | 14 | 8 | 13 | 6 | 2 | 11 | 15 | 12 | 9 | 7 | 3 | 10 | 5 | 0 |
| 3 | 15 | 12 | 8 | 2 | 4 | 9 | 1 | 7 | 5 | 11 | 3 | 14 | 10 | 0 | 6 | 13 |

Figure 4. An S (Substitution) Box

the procedure an effective encryption system.

The S Box

We have shown how the XOR operation and the P box are little encryption systems in themselves — they have keys, invertibility and deal in set blocks of bits. Now we come to the third and final concept used by DES: the S, or substitution, box.

The S box embodies the concept of confusion. Instead of simply shuf-

fling bits around, it takes advantage of some higher order properties of bit patterns and substitutes a new bit block for an old one. It looks at more than the order of 1s and 0s; it takes advantage of the numerical properties of the input bit block. In this process, not only are bit parity and quantity potentially destroyed, but total bit number of the output block is often different from the input. This is something new; XORing and P boxes don't do this. Take a look at Figure 4.

The best way to represent an S box is as a substitution table. Here are the rules for using the one in Figure 4:

1. This S box accepts inputs of 6-bit segments. In this case, it's 101011 (most to least significant is left to right). Take the first and last bits (11). This is the binary representation of the decimal number 3. This is going to be the chosen row in the S table.

2. Take the middle four bits (0101). This is the decimal value 5. This is the chosen column in the S table.

The table in Figure 4 shows that row 3, column 5 contains the value 9 (1001). Given an input of a 6-bit number (ranging from decimal 0 to 63), the table returns a 4-bit number, that is, the contents of the table have values from 0 (0000) to 15 (1111). Note that it is quite possible to fill the table with 6-, 8- or even 613-bit numbers. Or, the selection rules for determining the rows and columns could be quite different. All this is quite arbitrary.

We do not have a "mini" encryption system in the S box. An encryption system must be invertible. A brief glance at the table in Figure 4 shows that there are duplications in the table elements. There are four occurrences of the value 15. This means that there are four possible input 6-bit patterns that produce a value of 15. If 15 is our ciphertext, then there are four possible cleartext values.

It's a little sad that at this last step we lose the concept of a big encryption system made up of little ones. In fact, the S box in Figure 4 is actually used in DES. But DES contains S boxes for the very best of reasons. The very reason that the S box is not a stand-alone encryption system is its strength. It introduces nonlinearity to DES. A process is nonlinear, in this case, if you don't get the same number of things out as you put in. It makes cryptanalytic investigation of DES ciphertext virtually (but not absolutely) impossible.

Getting Closer

Believe it or not, we can now explain a number of the behavioral aspects of DES as described in the first section of this article. First, we have seen that all of the elements (XOR, P and S boxes) of DES require a particular bit block length. Hence it makes sense that DES requires some fixed block length. And two of the three elements, the P box and XOR, are invertible systems; they are utilized in combination to make, eventually, the invertible DES.

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But most important, we can now demonstrate why DES is so incredibly sensitive to single bit changes in cipher or plaintext (we'll get to the sensitivity to keys later). Let's start putting things together.

Suppose we string a series of different P and S boxes together as shown in Figure 5. On the left is an input bit pattern of 8 bits. (This isn't DES — this system has a block length of 8 bits. Would you like to draw Figure 5 with a 64-bit input?) This input pattern is simple: 10000000. It allows us to trace the paths of set bits through the layers of P and S boxes shown in Figure 5.

The input bit pattern is first diffused by P_1 (step A). The output set bit emerges from P_1 as bit 1 input to S_1 . These S boxes are not the same as shown in Figure 4; they are simpler. They accept input of four bits, then output four bits. The row and column selection rules are not important. What is important is the fact that any output 4-bit pattern may emerge given any input 4-bit pattern. These diffused values are determined by the arbitrarily arranged elements in the S boxes. These must be 4-bit numbers.

Back to Figure 5. The output of P_1 (step A) is 00001000. The single set bit has been permuted (as were all the others, but we can't see it because they are all 0s). It just so happens that the input of 1000 into S_1 in step B produces an output of 0011. Now there are two set bits entering P_2 .

These two set bits, after their permutation, enter S_2 and S_3 in step D. S_2 produces a bit pattern of 1011 and S_3 outputs 1001. Now we have five set bits entering step E, P_3 . There is no need to explain this any further. After S_4 , S_5 and P_4 , we wind up with an output bit pattern of 10111100. By serially connecting P and S boxes, we have created a cascading effect. A single set bit becomes five set bits.

And everything has been scrambled.

The whole process is not unlike a fission chain reaction. The P boxes shuffle the bits, providing diffusion, and the S boxes multiply this effect. S boxes can potentially increase the number of set bits and, if designed properly, usually do. The result, in Figure 5, is an unpredictable avalanche of 1s from a single 1 and seven 0s.

As stated in the first section of this article, "If you change a single bit of

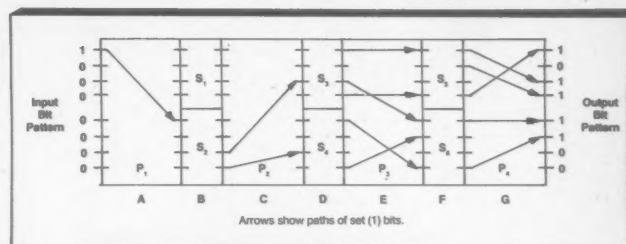


Figure 5. A Block Product Cipher

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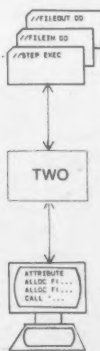
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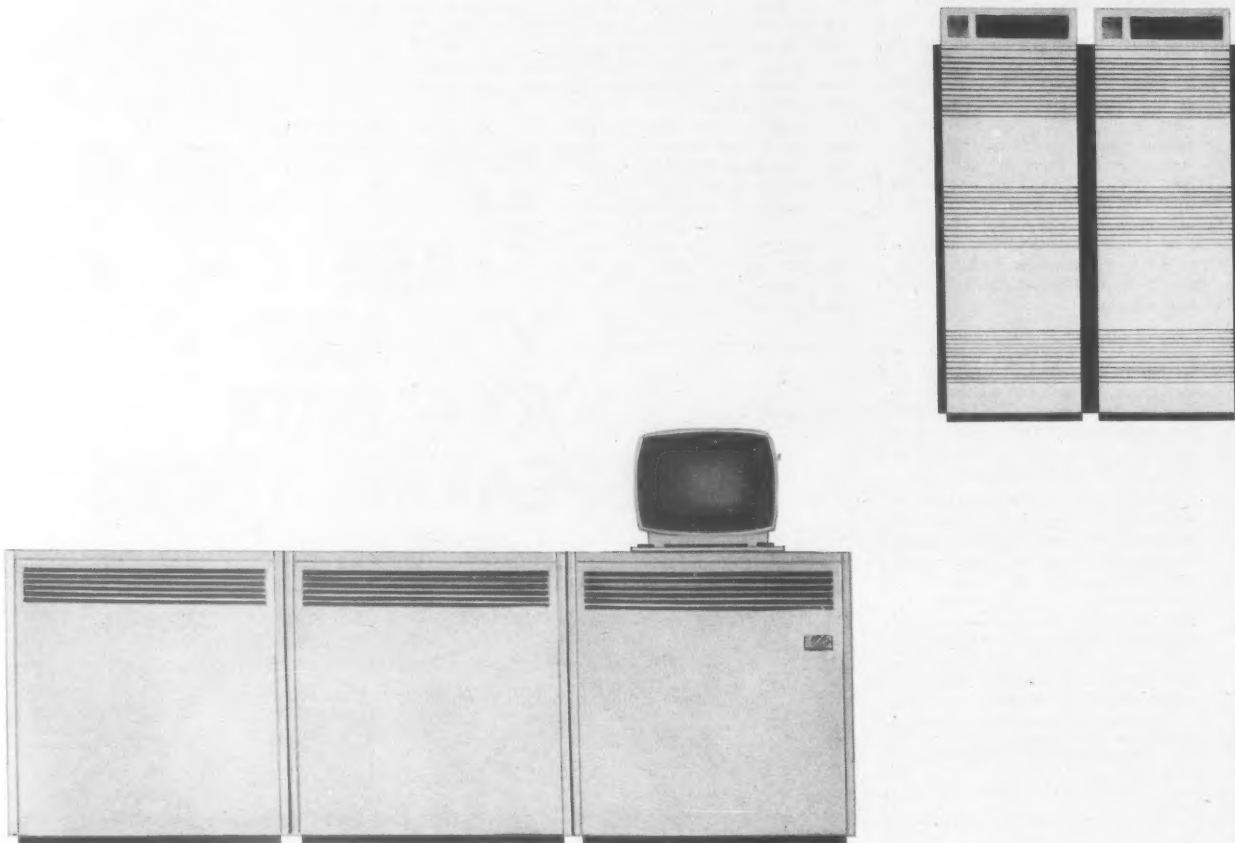


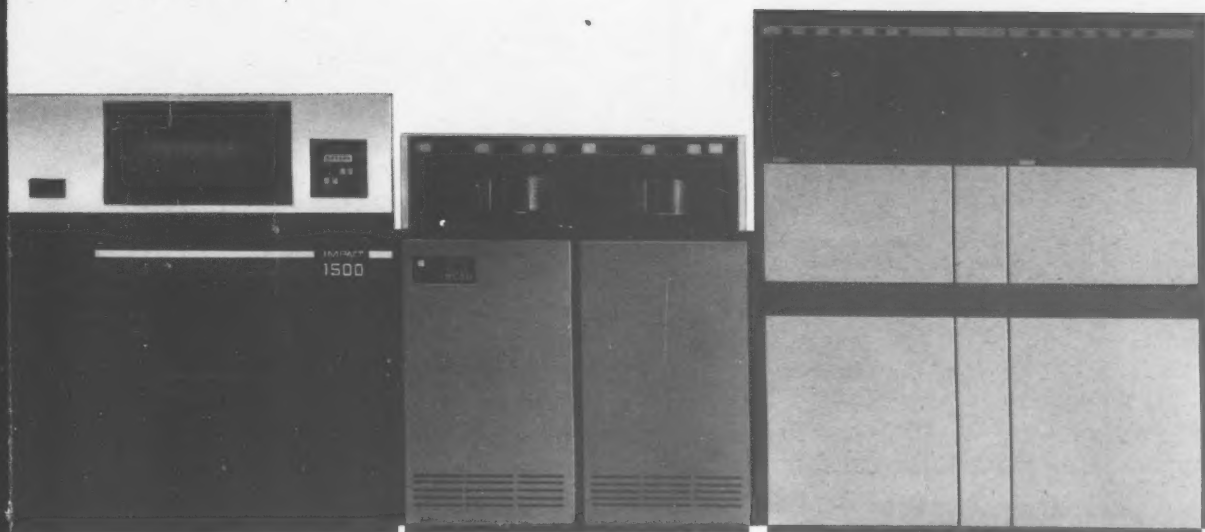
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In Depth/26

IN DEPTH

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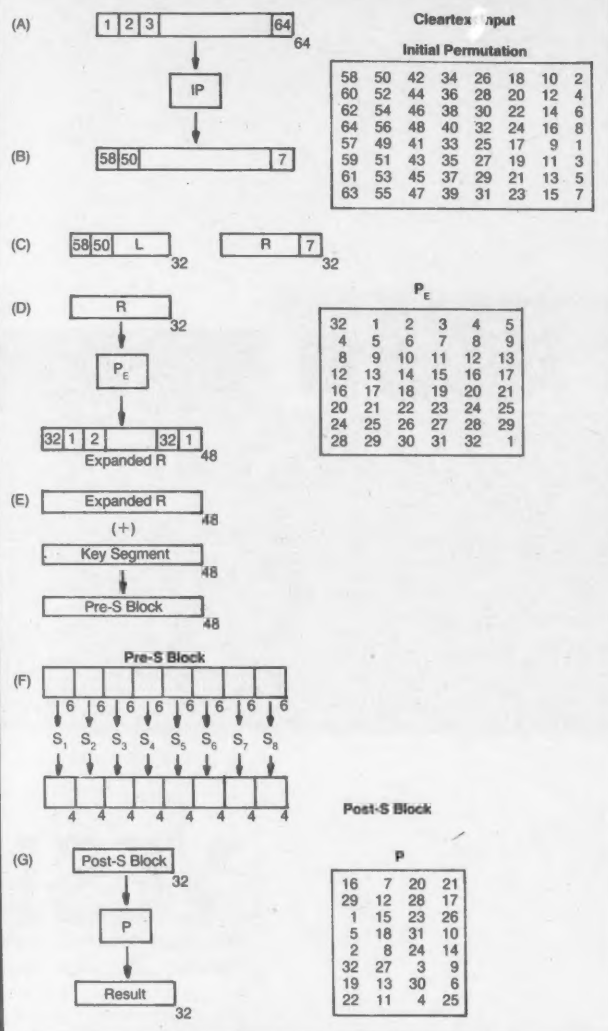


Figure 6. Step-by-Step DES

ciphertext then attempt a decryption with the true key, you get nothing related to the cleartext."

Now we're getting somewhere. Sure, Figure 5 is not an invertible system and there is no key. But this is the backbone concept behind DES. It's called a *block product cipher*. It's called a cipher for obvious reasons. We have seen why it is a block cipher: because its most basic unit is an S and P box combination. This combination is like the *product* of two effects. In this case we used different S and P boxes in each unit. When you use the same series of S and P boxes over and over again, you get a *recirculating block product cipher*. And that's what DES is.

Putting It All Together

Now we will take a step-by-step walk through a single circulation in a DES encryption. Each step is represented in Figure 6.

• **Step A.** Take 64 bits of cleartext. This, as all bit blocks in Figure 6, is represented by a thin rectangle with a subscript of 64. Bit 1 starts on the left.

• **Step B.** Rearrange this block by a P box called the Initial Permutation (IP). After this permutation, the bit that was in position 58 is now in the first position; position 50 goes to the second position and so on until the old bit 7 is now in the new 64th position. This P box is shown in Figure 6B.

• **Step C.** Split up this permuted block into two 32-bit segments. We'll call them L and R for left and right halves.

• **Step D.** Now comes the interesting part. So far we have only diffused data with a single 64-bit P box. We are still able, if we like, to follow the course of a single bit through the system.

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block, R. For now we will shelve block L. Subject R to a special P box called P_E in Figure 6D. The purpose of P_E is to expand R into 48 bits. As you can see from the permutation table, this doesn't do too much actual permuting. This is a P box that has 32 entry points (for mongooses and cryptanalysts) and 48 exits. Given such a box, you could only conclude that either 16 of the "passageways" are blind or, as is the case, some single entry points have pathways to

more than one exit point. The result of P_E is called Expanded R in Figure 6D.

• **Step E.** Take Expanded R and XOR it with a 48-bit segment abstracted from the 64-bit key. Remember, the XOR requires equal numbers of bits for each participating segment. So, we can see that the designers of DES used P_E primarily to expand to 48 bits in order to accommodate interaction with this mysterious key segment.

You must be wondering how this 48-bit key got into the act. What happened to the other 8 active bits? What part of the key is this? Don't panic. For now, let's assume that there is a separate algorithm sitting out in space that abstracts 48-bit segments from the key. We will get to this later. The vitally important point to note is that this step is the only point in DES where the key is involved in the calculations.

Let's summarize. We have permut-

ed the cleartext 64 bits. Then we split it in half. We shelved the left half and subjected the right half to a permutation whose primary purpose is to expand it to 48 bits to prepare it for an XOR with some mysterious part of the key. Already you can see the cleartext bits getting pretty mixed up.

Let's take the simplest of examples. Imagine the cleartext is all null (0) bits. Therefore, the initial P box has no effect. The P_E on the R half also does nothing. But now we apply the more complex transformation of XOR. A little thought should lead you to the conclusion that the XOR of null bits against any bit pattern produces the bit pattern itself. Therefore, at this time (not very far into DES) there are at least 2^4 possible outputs from Step E.

• **Step F.** This is the beginning of the process where "confusion" (hopefully not yours) enters the picture. The output of the XOR in step E is called the Pre-S block. Here come the S boxes. Recall the previous example of the S box (Figure 4). The input to that S box was a 6-bit segment and the output was a 4-bit segment.

Now take the 48-bit Pre-S block and split it into eight sections, each 6 bits long. Each of these 6-bit segments is then processed by a different S box (labeled S_1 to S_8). This is a parallel operation. S_1 processes bits 1 to 6 in Pre-S, box 2 processes bits 7 to 12... until S_8 processes bits 43 to 48. Figure 4 is the actual S_1 as used in DES.

We have just applied eight S transformations to a twice-permuted then XORed value. Each S maps 6 bits into 4 bits.

• **Step G.** Now we string the output from the S boxes back together. It's marked Post-S on Figure 6G. Put together eight segments, each 4 bits long, and the result is a 32-bit segment. The last step is to add insult to injury and submit Post-S to a final P box. This is a true P box, that is, 32 bits in produce 32 bits out. The output is called "Result" in Figure 6G.

What happened? We took half of the cleartext information (R) and blasted it with two permutations (P_E & P), an XOR with a key segment and eight S boxes. The P and S boxes are forever fixed transformations. But the insertion of a key segment has "individualized" the process. Because of the total number of possible keys, the total number of possible outcomes from this process, given a single 32-bit segment of cleartext, is staggering.

We have created a block product cipher that operates on 32-bit blocks. The entire process is shown in a more compact form in Figure 7. The steps, as described above and in Figure 6, are labeled similarly on this diagram. Essentially, we have performed a P transformation (P_E), an S transformation (S_1 to S_8), then a final P (P) transformation. This is like the process shown in Figure 5. We have

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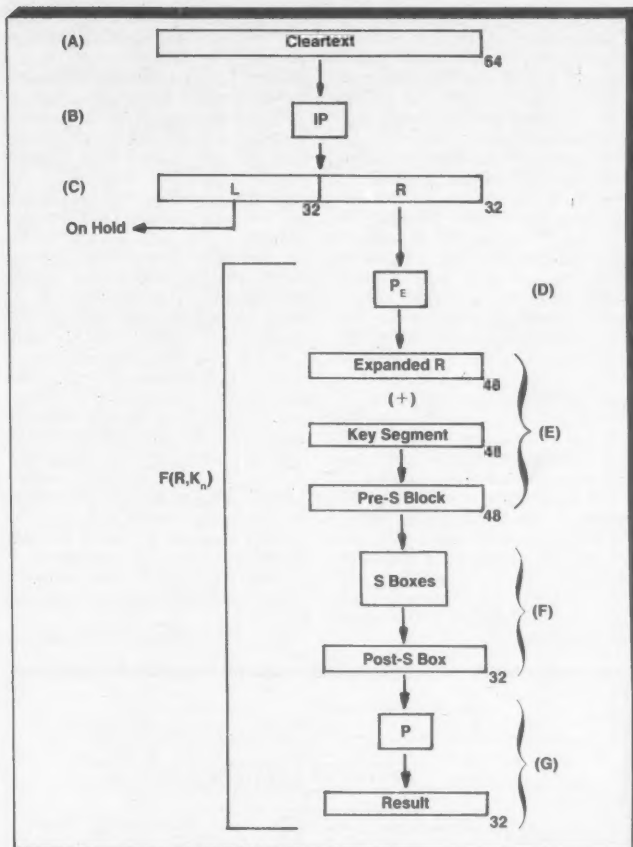


Figure 7. Flow of a DES Round

layered the steps P-S-P. The result is the expected avalanche of bits. And we have sneaked in a key segment to make Result *unique* to each chosen key.

In Figure 7, steps D through G are clumped together under one monumental label called $F(R, K_n)$. This is the mathematician's way of telling you: "There's a lot going on in here and I'm not going to tell you what it is except that I did something to R, the right half of the cleartext, and it involved K_n , part of the key."

So, steps D through G are a function of the segment R and a piece of the key. This is actually a very concise way of saying things as long as you already understand what is going on. Otherwise it's like getting garrotted from behind by a maniac cryptographer. The reason steps D through G are only a function of R and K_n is these are the only values that *change* when we use the function. This type of notation often does not talk about "constants," such as the S and P boxes. The elements of these boxes and the selection rules do not change.

Completing the Picture

$F(R, K_n)$ did some tricky things to the right half, but what about L, that other half we left on hold (Step C)? Figure 8 tells all.

• Step F. Now L is XORed against

the output of $F(R, K_n)$, the heavily confused and diffused 32-bit block named Result. L hasn't seen any of the working over received by R. The only thing that has happened to L is the first permutation, IP. But, XORed against Result, the output of this operation "assumes" much of the diffusion and confusion that has been perpetrated on Result. For reasons to be explained, we will call this 32-bit block "New R." And let's take the near-virgin R [before $F(R, K_n)$] and call it "New L."

We have only done an XOR and renamed a couple of blocks. Now, as shown at the bottom of Figure 8, let's put them together to make a 64-bit segment. Way back when, IP delivered 64 bits. Now we have a 64-bit segment again. What would you like to do with it?

I say follow the arrow beginning at the bottom of Figure 8 and dump all 64 bits *back into the same processes*. Except this time there has been a switch. What was L has indirectly become New R. What was R has become New L. This is done because the old L didn't get much of a workout, only a little diffusion from IP. Now, as the New R, it will go through the same bit massacre that the old R did.

We are now *recirculating* through the same process. Up until now we

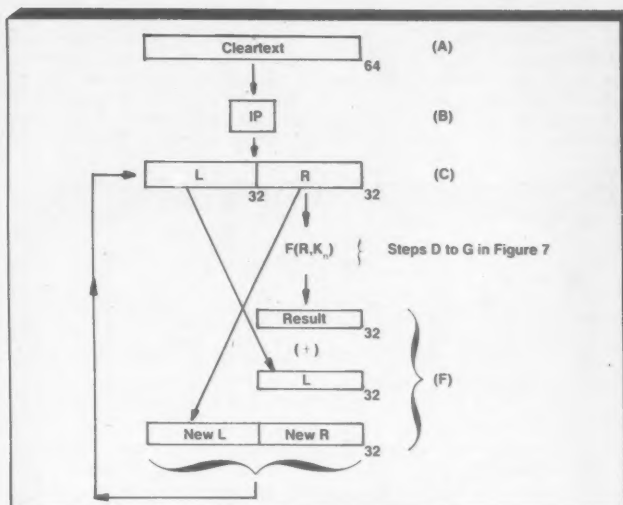


Figure 8. A DES Recirculation

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IN DEPTH

have produced a block product cipher. Now, by switching things around and dumping them back into the same hopper, we have DES, a recirculating block product cipher.

Actually, things aren't exactly the same the second time through the

pipes after the L-R switch. All the P and S boxes are the same, but the 48-bit key segment this time is different. So, this next recirculation uses a different key segment. You can see the ramifications of this by looking back at Step E in Figure 7. Uniqueness is in-

jected into every recirculation.

Now we're ready for what could be, without proper preparation, cryptological shock therapy: the DES presentation as in Fips No. 46. The National Bureau of Standards is a worthy organization; there is no intention here to downgrade its state-of-the-art research and publications. But its documents are not primers. DES needs more of an introduction.

Figure 9 shows DES reproduced from Fips No. 46, Page 8. So far we have discussed only the top half of the diagram, the first two "circulations." The Input is the 64-bit clear-text. This is subject to the Initial Permutation, called IP in Figures 6B, 7B and 8B. L_0 and R_0 are the 32-bit left and right halves as in Figures 6C, 7C and 8C.

Let's follow the route of R_0 . The arrow leaving this 32-bit block goes two places: to the circle marked "f" the to the block marked $L_1=R_0$. This circled "f" is the function $F(R_0, K_1)$ marked in Figures 7 and 8. Note how K_1 , the first key segment, enters the circled "f." Then R_0 , which is R in Figures 6 through 8, goes through steps D to G in Figure 7. The output emerges from "f."

The arrow continues on to meet the circled "+." This is an XOR. So the processed R_0 is XORed with the untouched L_0 , then continues on to become $R_1=L_0 \oplus f(R_0, K_1)$. This is what I called the New R. The Fips notation is concise: Before the second pass through "f," the New R, R_1 , is equal to the XOR of the old L, L_0 , against a functional combination of the old R (R_0) and K_1 , the first key segment.

R_0 also has a path to the 32-bit segment called $L_1=R_0$. This is the switchover shown in Figure 8. L_0 , what I called L, was "shelved" and waiting to be XORed with the result of $F(R_0, K_1)$, which becomes New R.

Now the recirculation begins. The same process is repeated, with the same circled "f," except this time the key segment entering from the right is K_2 , a different "part" of the key. Subsequent circulations continue and are displayed in a generalized fashion by the dotted lines with the nth key segment, K_n , being the only difference from one circulation to the next. That's why I used the notation $F(R, K_n)$ when talking about the circled "f."

The recirculating continues 16

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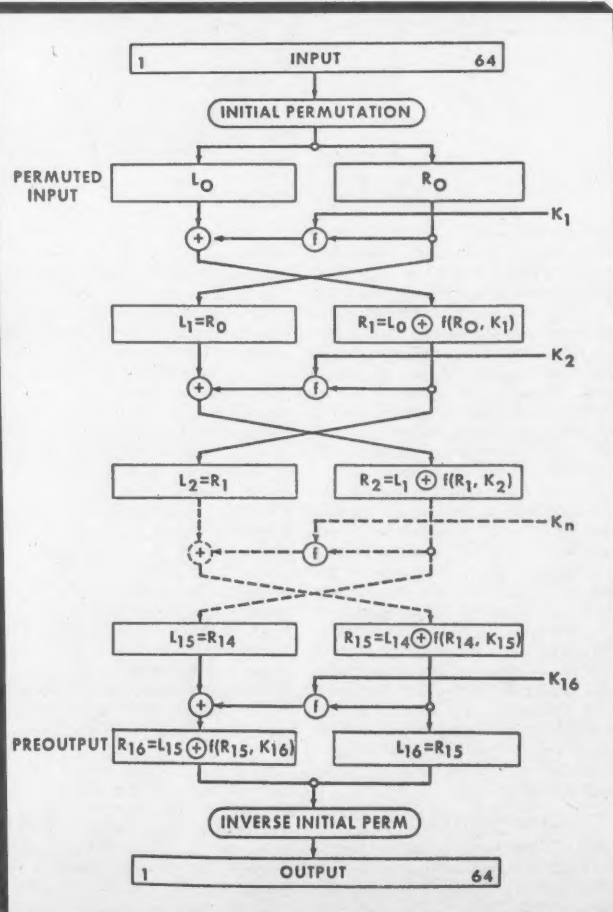


Figure 9. DES From Fips No. 46

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IN DEPTH

times before the step called Preoutput. Go back and look at Figure 6. The process in Figure 6 (steps C to G) is repeated 16 times for each 64-bit block to be encrypted. And each recirculation involves a different key segment. Combined with the crossover effect, the total amount of confusion and diffusion in this system is astronomical.

You should have no trouble seeing that a single change in a cleartext bit produces a completely different ciphertext block even if the same key is used.

Similarly, a single bit difference in the key must also have a profound cascading effect.

I'm going to leave this key segment business as something of a mystery. Space considerations do not allow a full discussion. Obviously, from Figure 9, there are 16 different key segments generated from a single 64-bit key. The algorithm used is called the Key Scheduler. It is a set of bit shifts and permutations totally independent of DES. It has nothing to do

with the DES algorithm other than that it provides these 16 48-bit pieces.

In practice, the key schedule (the 16 pieces) is computed before any encryption takes place. Then the key segments are used by DES. DES is never implemented in a way that recalculates K_1 to K_{16} every time it crypts a block. This would be a blatant and unnecessary increase in hardware or software runtime overhead.

Now the description of Figure 9 can

be completed. The output from the 16th round (Preoutput) is not the result of a "crossover." There is an asymmetry in the diagram. Little can be said about this at this point except it is necessary to retain the invertibility of the DES algorithm. The Preoutput is subject to a final Inverse Initial Perm. This is the inverse of the Initial Permutation at the beginning of the process. This, too, is required for invertibility.

What about encrypting and decrypting? Is the system totally invertible like the XOR? No. It is very much like what we had to do to make a P box an invertible cryptosystem. We had to turn it around. The "same" applies to DES. Figure 9 is a DES encryption. To decrypt, you need only reverse the order of the keys; K_{16} is in the first round, K_1 in the second and so on. Otherwise the same algorithm is used to encrypt and decrypt. This may not make much difference to the user, but it makes life a lot simpler for those who produce DES software and hardware.

Summing Up

At best, this article is an introduction to an introduction. The guts of DES have been explained to a certain degree, but some very important questions have not been answered.

Of course there is the persistent question: "OK, so I have an idea of how DES works. But how do I use it? Do I use software or hardware for my application? How do I properly manage keys?" Total coverage of these questions requires at least an article about each. The question of key management is the most important and the most difficult to answer. Lose a key and you have lost your data; disclose a key and, in many situations, you are exposing your jugular.

This article intended to give some idea of the interaction of DES's cogs and gears. Certainly you can drive a car without understanding what goes on under the hood. But you may just save yourself a few hundred dollars one day if you happen to know that a simple loose lead to a spark plug makes your car run as if it's ready for the junkyard.

On June 21, the author's companion article on how to manage DES will appear in In Depth.

About the Author

Michael Schwartz is owner and founder of Prime Factors, a 2½-year-old Oakland, Calif., firm that specializes in software encryption systems for mainframes and minicomputers. Prime Factors has installed DES software, from Fortran source to high-speed file-oriented assembler systems, for public- and private-sector organizations.

Prime Factors also provides general encryption consulting services for major financial and manufacturing institutions.

Schwartz, who has more than 11 years of data processing experience, holds degrees in anthropology and physics from the University of California and Northwestern University.

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Laying the Groundwork for

OFFICE AUTOMATION

Three pioneer members of the Office Automation Round-table describe how to justify, plan and implement an office automation project.

**By Mark Lieberman,
Gad Selig
And John Walsh**

1. Assessment.

The quantifying and qualifying of potential benefits and cost-saving opportunities through the introduction of office systems technology can best be achieved through an internal assessment program. The results of this assessment will provide the framework in which actual savings can be determined.

Much of the research material that has been developed about the office has been too generalized to be considered for inclusion in a benefits analysis for presentation to management. Most of the studies have concentrated on the area of text processing or have been primarily qualitative. Some studies have made detailed analyses of management, professional, clerical and secretarial activities; however, because of wide variation among the functional needs in different industries, it is difficult to extrapolate published statistical results and apply them in any general fashion.

The first half of this article is mainly intended to provide a framework for identifying areas of cost, benefit and opportunity. Part 2 provides a more detailed framework for analyzing, classifying and matching the specific application needs with available technologies.

It is also necessary to analyze such areas or processes as mail, tele-

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IN DEPTH

phone use and filing system characteristics. Moreover, it must be noted that it may be a gross error to assume that all organizations have similar or identical needs.

There are several important aspects of conducting an office needs study. The first step is formation of a study team, which should consist of personnel with experience in business systems, planning, statistics, human factors and similar disciplines. The second is implementation of a variety of available survey tools and methodologies. Other aspects include the use of statistically valid measurement techniques, access to data entry and analysis support and internal promotion of the survey effort to solicit the necessary internal support.

One of the first steps in conducting the study should be the development of a profile of expense categories that can potentially be reduced through implementation of office systems applications. Certain preliminary and basic information must be gathered, accumulated and analyzed to establish the proper reference base for identifying opportunities, benefits, costs and potential constraints.

Sources of Information

Only a broad and systematic analysis will enable the office systems planner to identify opportunities over an extended period of time. Because such an analysis may be costly, time-consuming and sensitive, senior management must approve it before the analysis is conducted. The data for the study may be gathered from a variety of sources. Among them are:

- The annual report of the company.
- A copy of the Form 10K statement filed by the company.
- Corporate archives.
- General corporate information centers.
- Corporate staff profiles.
- Operating unit profiles and strategic plans.
- Corporate personnel data.
- General ledger financial data.
- Fixed assets records.
- Corporate manuals.
- Organization charts.
- Management and planning reports.

Additional information about management, professional, secretarial and clerical needs will also have to be

developed.

Specific data will have to be gathered about how managers and professionals spend their time — reading, writing, attending meetings, receiving and responding to

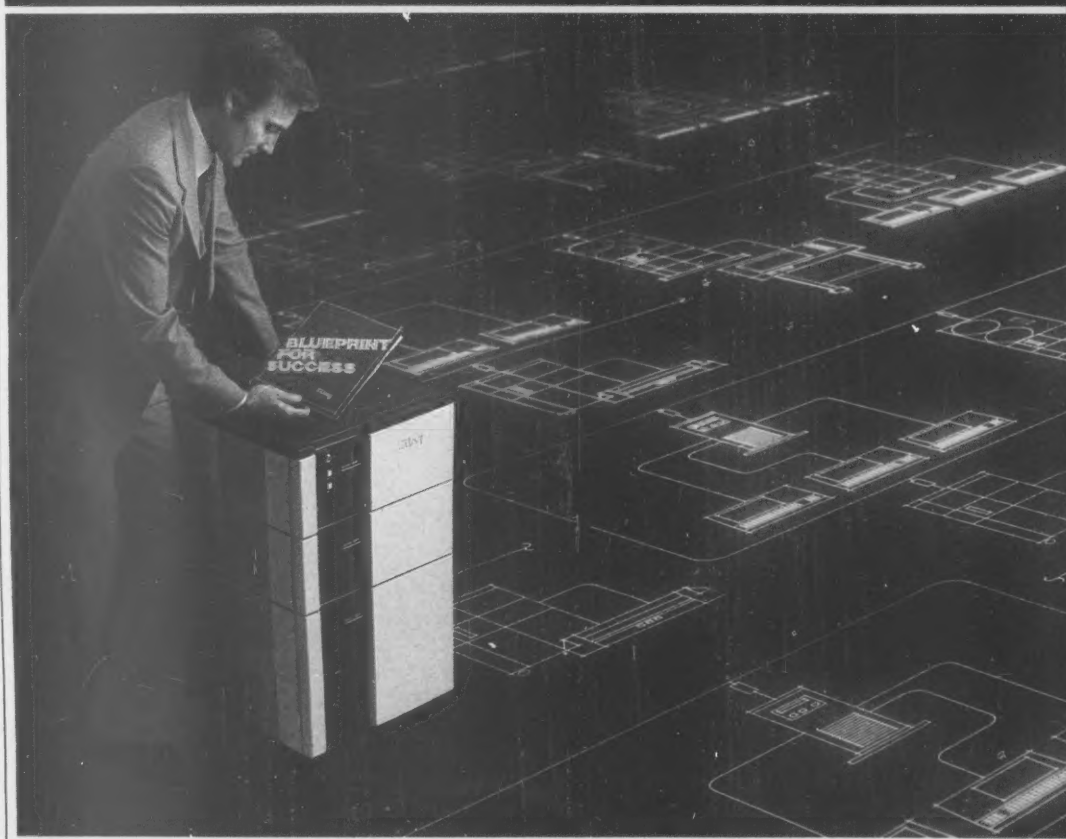
communications, searching files, planning and other activities. This information will have to be analyzed by level, by department, by function and by other categories.

An effort should be made to determine the amount of managerial or professional work that could be delegated to the secretarial or other staff. This result should be correlated against the admin-

istrative tasks performed by both categories to determine cost savings opportunities.

Managers and professionals must be questioned carefully and in detail concerning the types of problems they en-

Zilog's Supermicro



IN DEPTH

counter. For instance, in previous studies a major problem category was the large number of interruptions most managers encountered routinely, which hampered their ability to concentrate

on regular business matters. Another typical complaint relates to information. This usually translates into a need for improvement in the timeliness and availability, format, accuracy and retention

of information needed to perform managerial or professional functions.

Specific data will also have to be gathered on how secretaries and clerical staff spend their time — typing, filing,

copying, scheduling meetings and performing other duties. This data will have to be further analyzed on the basis of the number of managers and professionals supported. Active procedures

for specific tasks (for example, handling mail, taking messages) will also have to be studied to provide an appropriate understanding of the levels and types of administrative support services received and/or really required by managers and professionals. Problems and constraints should also be probed so that any inadequacies may be identified and addressed appropriately.

Information Categories

It will be necessary to identify the most commonly used processes, procedures and techniques for the creation, capture, preparation, distribution, storage, copying and destruction of documents and other data. In addition, basic data on the types of documents and volumes and their original and ultimate destinations will have to be included. Where appropriate, problems associated with existing procedures should be identified and recommendations for improvements developed.

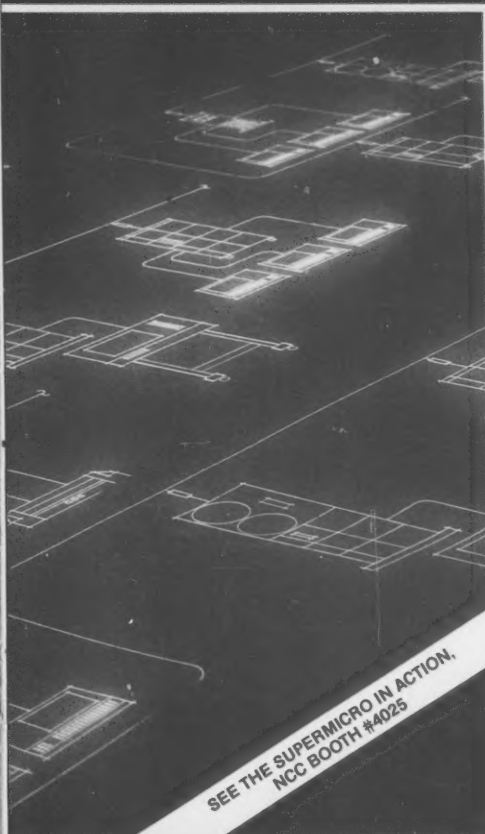
The National Bureau of Standards (NBS) has established classifications of typical "office products," which are listed in Table 1 (on In Depth/39). Other examples of the work of NBS are shown in Tables 2 and 3 (on In Depth/40 and 41), which illustrate a framework for identifying and ranking potential productivity improvements based on key product time and cost factors. In these examples, the office automation analyst identifies key products and the work activities (for example, professional time and support time) associated with the preparation process.

Preliminary Classification

Once the data has been documented, it must be classified into meaningful categories for analysis and evaluation. These classifications include:

- Direct expenses.
- Indirect expenses (for example, rent, utilities, mail utilization, supplies, office equipment).
- Job classification by level (executive, middle and first-line management; professional and technical; secretarial/clerical).
- Functional categories (legal, research and development, finance, engineering, human resources, corporate staff, marketing).
- Organizational structures (centralized, decentralized,

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matrix).

- Physical locations (continent, country, state, region, department, individual workstation).

Other data classifications may be made by salary and benefits information (by job classification), head-

count projections, corporate and local personnel policies and procedures, employee turnover ratios, temporary and overtime policies and expenses, and records and file management procedures.

Although it is generally difficult to

build a data base of this information, such an activity must be started. If it becomes too difficult or expensive to obtain data companywide, the focus should be narrowed to a more realistic but representative sample. As the sample size is reduced, however, it

becomes more difficult to project and substantiate the findings.

Development of Equipment And Services Inventory

Another important segment in the preliminary office systems survey is

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IBM

OFFICE AUTOMATION

IN DEPTH

a detailed inventory of existing equipment and services to help classify and identify expense levels and cost-saving opportunities. To encourage positive user participation, the preliminary data-gathering process should be made as simple as possible.

An inventory of equipment and services should include the following categories:

- Telecommunications systems and services.
- Telecommunications networks/facilities.
- Computer systems and services.
- Text processing systems.
- Calculators.
- Typewriters.
- Graphics.
- Energy systems.
- Forms design systems.
- Personal computers.
- Printing and publication systems.
- Copier and reprographic facilities.
- Mail and related distribution systems.
- Micrographics.
- Time-sharing systems.
- Library facilities and services.

An assessment must also be made of existing procurement and related fi-

Correspondence

Letter
Memorandum
Message

Reports

Management
Trip
Technical
Incident
Project status
Fiscal
Personnel
Weekly activities
Material deficiency
Training

Documents

Statement of work
Specifications
Procurement plan
Program management directive
Program management plan
Letter request
Sole-source justification
Determination and finding
Invitation for bid
Request for proposal (RFP)
Equal Employment Opportunity (EEO) certification

Small business coordination

Preaward survey
Model contract
Change order
Administrative notice
Source selection plan
Annual call for estimates
Procurement directive
Delivery order
Cost estimate
Independent cost analysis
Contract funds status report
Staff meeting agenda (and report)
Action item list
Configuration change status report
Engineering change proposal (ECP)
Quarterly resources report
Systems safety program plan
Configuration control board minutes
Data management report
Training plan
Program management systems checklist
Contract management systems checklist
Site survey report
Environmental assessment
Life-cycle cost study
Phase-out plan

Forms

Security classification guide
Inspection and acceptance document
Data item description
Personnel action request
Time card
Work order request
Security monitor
Printing request
Position description
Purchase request
Report of survey
Travel request
Military order

Reviews/Briefings

Business strategy panel meeting
Quarterly financial review
Periodic program review
Project management review (PMR)
Executive management review (EMR)
Resources utilization committee action
Financial management board review
Division advisory group review
Internal management review

Audiovisual Aids

Vugraph
Briefing text, briefing board
Graphics aid, 35mm slides

Table 1. Typical List of Office Products

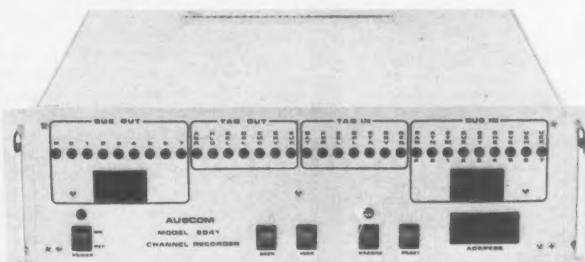
financial practices, including rental, lease or purchase procedures and contracts; inventory category by

number, value of equipment, vendor and location; and procurement policy and authorization levels.

For each category listed above, various statistics should be accumulated: functional utilization and penetra-

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| Key Products | Personnel Costs | Total Professional Staff Cost | Professional Cost/Professional Work | Professional Cost/Support-type Work | Total Support Staff Cost | Total Key Product Personnel Cost |
|--------------|-----------------|-------------------------------|-------------------------------------|-------------------------------------|--------------------------|----------------------------------|
| A | | \$ 4,026 | \$ — | \$ 4,026 | \$ — | \$ 4,026 |
| B | | 671 | 112 | 559 | 9 | 680 |
| C | | 3,523 | — | 3,523 | — | 3,523 |
| D | | 168 | — | 168 | — | 168 |
| E | | 587 | 84 | 503 | — | 587 |
| F | | 2,300 | 449 | 1,851 | 18 | 2,318 |
| G | | 29,500 | 14,500 | 15,000 | 14,100 | 43,600 |
| Totals | | \$40,775 | \$15,145 | \$25,630 | \$14,127 | \$54,902 |

Table 2. Annual Personnel Costs for Preparing Key Products

tion, application classification by new, revised and maintenance development expenditures and by major expense category (for example, personnel, hardware, supplies, utilities). Figures 1, 2 and 3 (on In Depth/42) illustrate these statistics for the computer systems component. Similar statistics should be developed for all office equipment and services.

Studies such as those conducted by Booz, Allen & Hamilton and the Stanford Research Institute have

clearly revealed that there are significant opportunities to impact personnel, equipment and service expense levels through the application of available and future technologies. These studies have projected savings based on detailed analyses of how office workers spend their time, what functions they perform, whether they are employed in structured or unstructured environments and whether available technologies might affect the related expenses.

The studies have also evaluated the direct cost impacts and functional benefits associated with other administrative expenses such as mail, communications facilities, copiers, data processing, travel, office and use of external office services.

In general, these studies have analyzed specific organizational populations and applications and have extrapolated summary benefit estimates. Estimates for potential average savings have ranged from 5% to 10% for executive management and from 10% to 20% for managers, professionals, secretaries and clerks; savings on other administrative expenses (such as energy usage) are also in the 10% to 20% range.

These industry estimates have been projected on the assumption of widespread office systems implementation. Such generalizations will vary and will be subject to wide variations based on such constraints as industry type, work force composition, type of work performed and level of technical sophistication and business maturity.

There are several approaches to evaluating and assessing data on the macro level. One method is to relate cost-displacement opportunities to entire categories of staff and related expense streams within the organization. Yearly savings and costs must be developed for comparative analyses and presentation to management. Some of the costs to be considered include equipment, software, staff, installation and facilities, maintenance, supplies and communications expense. Training and educational expense requirements should also be calculated.

These summary expense estimates may then be multiplied by the number of personnel to arrive at macro expenses, which can then be projected over time, using appropriate financial investment factors (cost of money, return on investment, investment tax credits and so forth). The benefit potentials by personnel can be computed in a similar manner to arrive at a net cost savings range.

With these savings and cost estimates available, capital investment requirements can be projected on a per-capita basis.

Identifying Areas Of Benefit and Opportunity

Some of the benefit and potential savings opportunity areas include:

- Personnel productivity/cost displacement opportunity (executive,

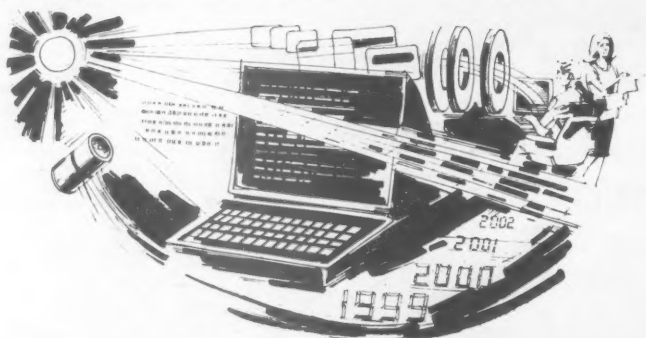
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middle and first-line management, professional and technical, secretarial and clerical).

- Expanded span of control (greater ratio of management to staff).
- Availability of information on a more timely, accurate and flexible basis.
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- Avoidance of increases in staff.
- Elimination of outside labor and facilities expenses.
- Reduced travel.
- Improved use of materials, space and facilities.
- Reduced use of external services (postage, messenger, typesetting, micrographics and so on).
- Enhanced decision support opportunities.
- Improved customer service.
- Improved employee satisfaction levels.

The opportunities should be expressed in terms of historical trends and future projections and should be presented in categories recognizable by senior management (for example, percentage of sales ratios/expense or job classification ratios). Benefits may range from modest to significant, may represent either hard or soft dollar results and may be either perceived or real.

The key is to present an objective business investment opportunity that identifies both opportunities and negative factors and considerations. The project opportunities uncovered should always be expressed in terms familiar to senior management and should conform to corporate objectives.

Paul Strassman stresses that the sequence for identifying opportunities should start with the budgeting process. It must identify all the components of information processing cost and segment them by (1) *function* — for example, the total cost of performing the billing function, from order entry until receivables are reconciled; (2) *technology* — for example, what portion of the billing cost is done clerically and what portion by computer; and (3) *organization* — for example, what the various billing systems of one organization are ("Managing the Cost of Information," *Harvard Business Review*, September-October 1976).

Key Ideas

Preliminary (macro) cost and benefit opportunities may be developed through proper quantification and qualification techniques. Related to this effort, the data developed may be used to secure management approval and funding for an office automation program.

This approach will require a significant and time-consuming effort, and senior management must be committed to the effort.

Study details and summary results and conclusions should be discussed in clear and concise terms that should be related directly to business

objectives, plans and opportunities. Technical presentations should be avoided at all costs.

2. Project Implementation

A successful implementation program requires that all possible activities and contingencies be anticipated and that solutions be planned. (Al-

| Products | Total Professional Staff Effort (Hours)* | Professional Effort/ Professional Work (Hours) | Professional Effort Support-type Work (Hours) | Total Support Staff Effort (Hours) | Total Key Product (Hours) |
|---------------|--|--|---|------------------------------------|---------------------------|
| A | 288.0 | 0.0 | 288.0 | 0.0 | 288.0 |
| B | 48.0 | 8.0 | 40.0 | 1.0 | 49.0 |
| C | 252.0 | 0.0 | 252.0 | 0.0 | 252.0 |
| D | 12.0 | 0.0 | 12.0 | 0.0 | 12.0 |
| E | 42.0 | 6.0 | 36.0 | 0.0 | 42.0 |
| F | 164.5 | 32.1 | 132.4 | 2.0 | 166.5 |
| G | 860.0 | 640.0 | 220.0 | 483.0 | 1,323.0 |
| Totals | 1,666.5 | 696.1 | 980.4 | 486.0 | 2,132.5 |

* A person-year is defined as 2,080 hours in this sample.

Table 3. Annual Levels of Effort for Preparing Key Products

“The proliferation of financial planning languages will create chaos throughout corporate management ranks. In the future, we will see one standard modeling language that extends from the personal desk-top computer to the central corporate information center.”



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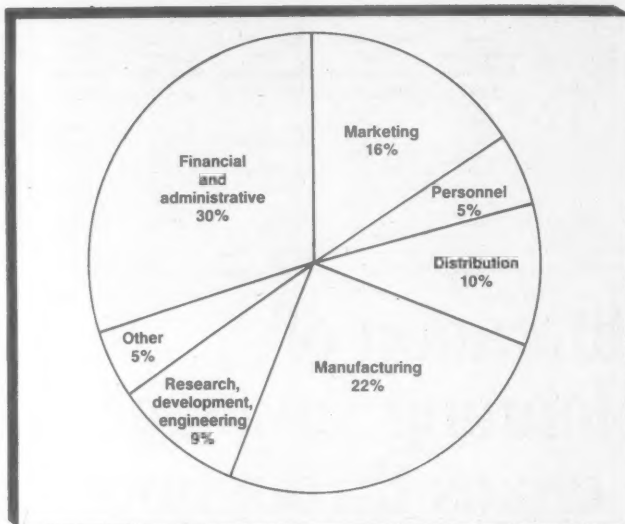


Figure 1. Sample Allocation of Computer Systems by Function

ways assume that Murphy's Law is in full operation: "Everything that can go wrong will go wrong.")

This will include such items as specifications, user acceptance, test

procedures, facilities, resource requirements, documentation, education and training. An acceptance and reliability program should also be in place. The office systems department

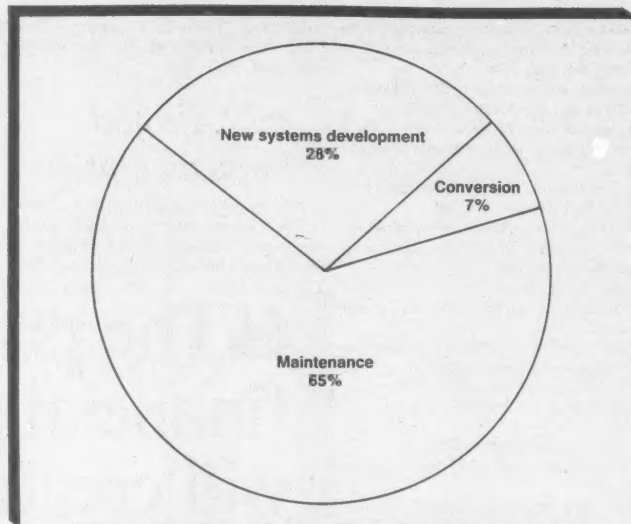


Figure 2. Sample Allocation of Computer Systems Efforts

staff must be available to the user community, and a reporting system for addressing user suggestions, recommendations or complaints must also be developed. If this system replaces an older one, a parallel operation should always be considered, and regularly scheduled user and vendor status meetings should be conducted before, during and after implementation.

A comprehensive facility planning program must also be developed as an integral part of any implementation.

Existing floor and building plans must be modified to depict furniture and equipment layouts and cabling, communications and power facilities. If users will be inconvenienced during the installation process, disruptions should be minimized and the users should be notified of the disruptions prior to the installation.

Implementation is an extremely de-

tailed, complex and technical undertaking. It should be approached carefully, methodically and with the regular use of detailed checklists. Without attention to detail, implementation can prove fatal to both the project and the entire office systems effort.

Overall program or specific project implementation does not begin until senior management approval is received and funding requirements are established. Plans should have been in place and hardware and software systems should have been selected on the basis of user requirements. Implementation requires unique skills, planning, experience, perseverance and a focus on detail.

Project Management

Project management requires financial and people management skills as well as knowledge of methods and procedures. The project manager

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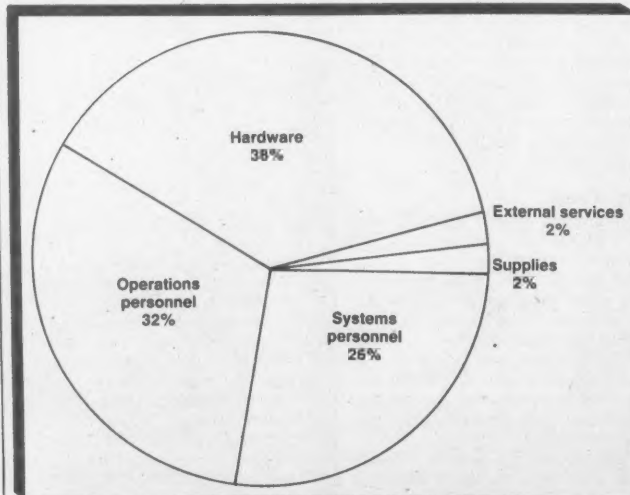


Figure 3. Sample Allocation of Computer Systems Budget

IN DEPTH

should take complete responsibility for all aspects of the project, even though many activities will be dependent on vendors, consultants and individuals from other departments. The project manager is a coordinator of activities, an allocator of resources and a technology specialist.

Each office systems project must be scheduled, resources must be allocated and specific responsibilities assigned. Individual tasks must be itemized, including how many calendar and people-months will be required during a specific time frame and when each "deliverable" is due.

The project schedule and implementation checklist should be structured to accommodate revision and status reporting. Without clearly defined milestones (costs, time, activities), any project is likely to be delayed and over budget.

The size of the project may require the use of scheduling and implementation tools such as the project evaluation and review technique (Pert), critical path method (CPM) or a Gantt chart. (Readers unfamiliar with these techniques should consult any of the numerous sources that describe them in detail.)

The project manager's primary concern is to satisfy the user. This objective can be easily overlooked under the pressure to complete the project on time, regardless of the nature of the delay. Completion of a project on time is an ideal goal; it is far more important, however, to satisfy user requirements even if additional time and expense are needed to do so. Projects that require significant delays in time and increases in expenditure should be reevaluated with corporate and user management at the earliest opportunity.

Three primary activities must be managed during implementation: project budgets, manpower requirements and scheduling. Not only must the project (or projects) be implemented successfully with regard to function and user acceptance, but it (they) must also be implemented within budget, with the allocated staff and on schedule. For these reasons, implementation requires considerable experience and awareness of project management disciplines (for example, budgets, scheduling, resource allocation and status reporting).

For control purposes, it is important to develop a project profile for each project to be implemented. A project profile should include the title of the project, manager's name, description of the project, objectives, deliverables, manpower, cost justification and savings. Figure 4 (on In Depth/48) is an example of a project description.

Specifications and Standards

Once requirements have been established, specifications and standards must be developed. To many, specifications and standards imply rigidity and inflexibility. If exercised

properly, however, these controls will result in a more effective system to meet user requirements. If controls are implemented intelligently and where necessary, savings in effort and expense will result.

Obviously it would be a mistake to insist that all keyboards meet a unique specification regardless of application. On the other hand, a very necessary standard that should be insisted on is a companywide communications protocol. Users should not

be obligated to accept a single product or vendor, but vendors should be required to meet specifications.

So far, most organizations have progressed haphazardly in selecting equipment for office applications. In these situations the integration of systems is a near-term impossibility.

A "black box" that provides compatibility between unlike systems may overcome this problem. Another approach is to develop customized software for a particular system.

The long-term and ideal solution would require industrywide standards, such as communications protocols, information formatting protocols, documentation, training, software development, facilities and security. To avoid incompatibility and duplication of effort, to reduce risk and expense and to facilitate integration and implementation, existing corporate or industry standards should be selected wherever possible.



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**Vendor Selection
And Support**

In this era of rapid change, dependence on a single vendor may not be the most appropriate strategy. In fact, change is probably the best rationale for the multiple sourcing of any product and service. Vendors themselves will readily admit to multiple-sourcing the electronic components used in their products for the same reasons. Accordingly, the number of preferred vendors should be kept to a minimum for backup, control and economies of scale.

To facilitate evaluation of products and vendors, vendor selection criteria should be determined. These criteria should include functionality, service support, financial strength, contract terms and conditions, product reliability, maintainability, availability, research and development activities and adherence to industry standards.

Facility Planning

Every new system requires facility planning. This planning will range from simple to complex (for example, from plugging in an electronic typewriter to installing a digital telephone system). Associated facility requirements may involve electrical wiring, conduit, communications cabling, furniture relocation, security, air conditioning or even relocation of office walls.

Regardless of system requirements, it is a mistake to assume that facility needs will take care of themselves. By ignoring these critical requirements, the planner runs a significant risk of implementation failure.

Training and Education

Training and education should address three distinct components: preinstallation, installation and post-installation requirements.

A preinstallation program must be initiated to include concept presentations, equipment training, system performance characteristics, facility and cutover plans, training techniques and schedules. Consideration of these factors will allow enough time for the users to ask questions, raise issues and acquire a better understanding of the system. It is far better to understand and address all known concerns before actual installation, not

during or after it. This approach will avoid many problems, concerns and fears.

Many implementation programs get off to a poor start because of user unawareness.

All too often, a system is selected for a user community without its direct involvement or only with the involvement of that group's senior or technical management. Even if this is

not the situation, users must be provided with meaningful and practical information prior to installation.

Although most vendor and user organizations strive to provide meaningful installa-

tion and follow-up training programs, the majority of these efforts have had limitations. The programs tend to be quite costly on a per-capita basis, and training is thus limited to a restricted num-

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ber of users and to an initial training course. As equipment costs decrease and vendor profit margins decline, training responsibility is shifting from the vendors to the users.

One serious situation that exists with a majority of office systems users is that only the most basic features of their systems are being used. Too often, users do not take advantage of the more so-

phisticated features for which the system was purchased. The reason for this neglect is poor user education and training, with little if any postimplementation reinforcement.

A better approach (and also a more costly one) is to provide initial training only on the basic system capabilities. A month later a follow-up course should be given on more sophisticated func-

tions. After another month, a review session should be given, during which the user describes the use of the new system in terms of the features used. During this review it should be determined whether additional training is necessary. Thereafter, reviews and additional training should be conducted on a regular basis to optimize system use and continually enhance users' skills.

Although this approach is expensive, time-consuming and requires a dedicated staff, it nevertheless results in more effective use of the technologies acquired. Additional education support includes internal and external newsletters, seminars on the use and application of office systems and similar sources.

Documentation Needs

Documentation requires the following components: user procedures, vendor manuals, operations manuals, security and backup procedures, systems requirements, specifications, flows, maintenance procedures and others.

Documentation is important because it provides continuity and direction between the office systems department staff and the users. All too often, documentation is given a low priority because of the time and effort required to develop it properly. In the long run, this will result in user confusion, discontinuity of operations and duplication of effort. As long as documentation is produced, it will provide a measure of safety and security.

Before developing, formalizing and distributing internal documentation, it must be reviewed and approved by the users. If a serious commitment is to be made, established companies that specialize in this field should be consulted. The key to writing user documentation is to assume the user knows nothing about the product and must be educated in all of its features.

Many internal efforts fail because documents are created by people who understand the product too well but never test or review their written material with the users. Experts tend to make presentations at the expert level. Too often they have difficulty in presenting such information to laymen in simple terms.

Within the office systems



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IN DEPTH

department, it is important to document all proposals, pilot projects and project findings. Copies of all non-disclosure agreements and of requests for information, pricing or quotes should be

maintained on file, along with all other vendor correspondence. Facility plans (by user location) must be drawn up and retained along with special furniture orders or modifications.

Postimplementation Assessment

Subsequent to the implementation or application of a new or an updated system, the effect of that system on

the productivity of its users must be evaluated. This will require a preinstallation assessment to establish a reference base for comparison.

The ideal environment would be one in which three

departments that carry out the same function (for example, marketing administration in regional sales offices) are evaluated prior to implementation. One department is provided with new technology designed to improve productivity; the second is offered new technology and a new methodology for the process being automated (this will be the most traumatic experience for the users); the third remains unchanged.

If the nature of the business or other influences do not impact these three groups, a postimplementation audit can be performed to compare the results. Although this approach is time-consuming and costly, it may prove important in order to demonstrate the expected productivity increases.

Other areas that should be evaluated after the implementation of new technology are the effectiveness of the training program, vendor support and service, documentation, the potential for additional applications and the effectiveness of the strategic plan.

To ensure the viability of the strategic plan, an evaluation should be made annually. A complaint registered in the 1970s against U.S. industry focused upon its emphasis on short-term planning and its lack of interest in the longer term. Without minimizing the necessity for developing and executing long-range strategies, it is imperative that those projects considered to be short-term (18 months or less) be carried out as effectively as possible.

There are two reasons for this urgency. First, failure to carry out today's projects skillfully will surely negate any longer range efforts. Second, management is often nearsighted and tends to approach the world on a "what have you done (correctly) for me lately" basis. Therefore, preservation and department longevity often depend on successful (profitable) short-term efforts. Awareness of this thought process will result in an approach that can be an extremely important subset of any longer term strategy.

Key Ideas

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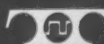
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IN DEPTH

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| Project Title: | Touch-Screen Interface | | |
| Project Manager: | W.M. Giles | | |
| Project Description: | Experience with office systems and display-based workstations indicate that principals, even those with keyboard dexterity, do not always take complete advantage of the system because of the inconvenience (real or perceived) in using the keyboard. By simplifying the interface to the system for the user, an improvement in system usage will result and, with that, greater efficiency. A touch-screen interface will permit the principal to interact with the system via fingertip touch on the screen's surface. By utilizing a menu-driven system and requesting user touch selection, the principal will find the human/machine relationship more friendly. | | |
| Objectives: | Improve the human/machine interface for principals by implementing touch-screen capabilities on existing systems. | | |
| "Deliverables": | By June 30, install touch-screen interfaces on 10 workstations, report on system usage and report progress periodically. | | |
| Manpower: | Project manager | 2.0 Work-months | |
| | Systems analyst | 1.5 Work-months | |
| | Programmer | 3.0 Work-months | |
| Costs: | Salaries and fringe | | \$ 24,650 |
| | Touch screens, etc. | | 96,475 |
| | Travel | | 2,500 |
| | Consultants | | 9,500 |
| | Other and contingencies | | 2,000 |
| | Total | | \$135,125 |
| Cost Justification: | To be determined by project. | | |
| Net Savings: | To be determined by project. | | |

Figure 4. Project Profile

ment does not necessarily result in successful implementation. Only those projects that are carefully planned, directed and monitored will succeed. Successful implementation requires skills such as attention to detail, use of checklists, good people skills, excellent negotiation skills, budgeting skills, scheduling skills, education and communication.

The potential inconveniences that may result from improper implementation planning can provide users and management with initial and sometimes irreversible negative impressions. It is therefore imperative to consider and check every possible requirement and overcome all obstacles in order to achieve a smooth implementation program. The user must be provided with preimplementation orientation, schedules, costs, facility requirements and potential production interruptions, along with warnings about any other business risks. The implementation team must obtain user approvals on the overall effort and apprise the user of any changes as they occur.

Success depends upon user acceptance and subsequent usage. Regardless of the strengths a particular

manufacturer may have today, situations change. A vendor may have the best products and service and the lowest prices this year, but next year the same supplier's success and rapid growth may place a strain on its spare-parts inventory or the responsiveness of its maintenance personnel. Vendor strengths and limitations change over time. Never put "all your eggs in one basket."

About the Authors

Mark Lieberman is director of advanced technology at the American Express Co., where he recently developed a corporate long-range office systems plan.

Gad Selig is director of technology and strategic consulting for Contel Information Systems. He is also an adjunct professor at several universities.

John Walsh is director of corporate telecommunications and office systems at Avon Products, Inc., where he is responsible for the operational and strategic planning and implementation of office automation, telecommunications and related technologies in a multinational environment.

Walsh is a cofounder of the Office Automation Roundtable. Lieberman is a founding member of that group, and Selig was its first chairman.

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IN DEPTH

The Political Role of The Data Base Specialist

By Grant Wiswell

A computerized data base system is a high-speed, high-volume tool for handling business records or scientific observations. The tool can be used to file, sort, retrieve and present these records. The effect of such data base systems is to bring about a concentration of activities that would otherwise be dispersed among clerks. Data base analysts, de-

Sullivan

IN DEPTH

signers and administrators, collectively referred to here as data base specialists, translate these clerical activities into the form of a data base. This translation is done for the benefit of a user, referring to the management of the organization, which has an interest in the data, as well as the individuals who will be making data entries and selections.

This translation takes place because the clerical activities are within the realm of the user, in a form familiar to the user. Before a data base analyst arrives on the scene, the user does not see his business records or research observations as having the particular form of a data base. The translation into a new form takes place according to the techniques available at a particular time.

For instance, about 20 years ago, an application being converted from a manual system might have been committed to a deck of punched cards, and 10 years ago it most likely would have taken the form of a hierarchical data base. Today, a manual system might be converted directly into a relational data base. Yet with each technique, the user's records would have been transformed and he would begin to look at his own information in a new way. From that point on, the user must find and manipulate his data through the conventions defined by the software. The greater his facility with the software, the easier the clerical aspects of his job become.

The data base designer performs a kind of manipulation when translating clerical activities into the form of a data base. Before this translation takes place, the user must trust the data base specialist.

Political Performance

In developing applications, a data base specialist has opportunities for both technical and political performance. Translating a user's requirements into a new form and working within a relationship of mutual trust are examples of political performance.

Except for the completely self-supporting user, data base people do not work alone. The data base specialist, working with and for others, has a political role. And there are more elements to this role than those already discussed.

Users are taught to depend on data base systems, and data base specialists teach them. This is accomplished as each new design is implemented and realized in the form of inquiries, reports, graphics and so on. This can only be possible if the user trusts the data base specialist.

Establishing Trust

The following is an example of how one data base specialist succeeded in establishing the user's trust. He was representing a time-sharing service bureau, which had assembled some management information data bases

for one of the Bell telephone companies. In an effort to promote further use of the data bases, the specialist had worked with a personnel department to develop a graph comparing planned staffing levels with actual assignments.

When this graph was presented to the user, based on one month's actual data, the user saw that actual assignments fell well below planned levels. Quite disturbed at his poor performance, the user requested that the

existence of this graphics capability not be revealed to any managers above him for two months. And he trusted the specialist not to reveal it.

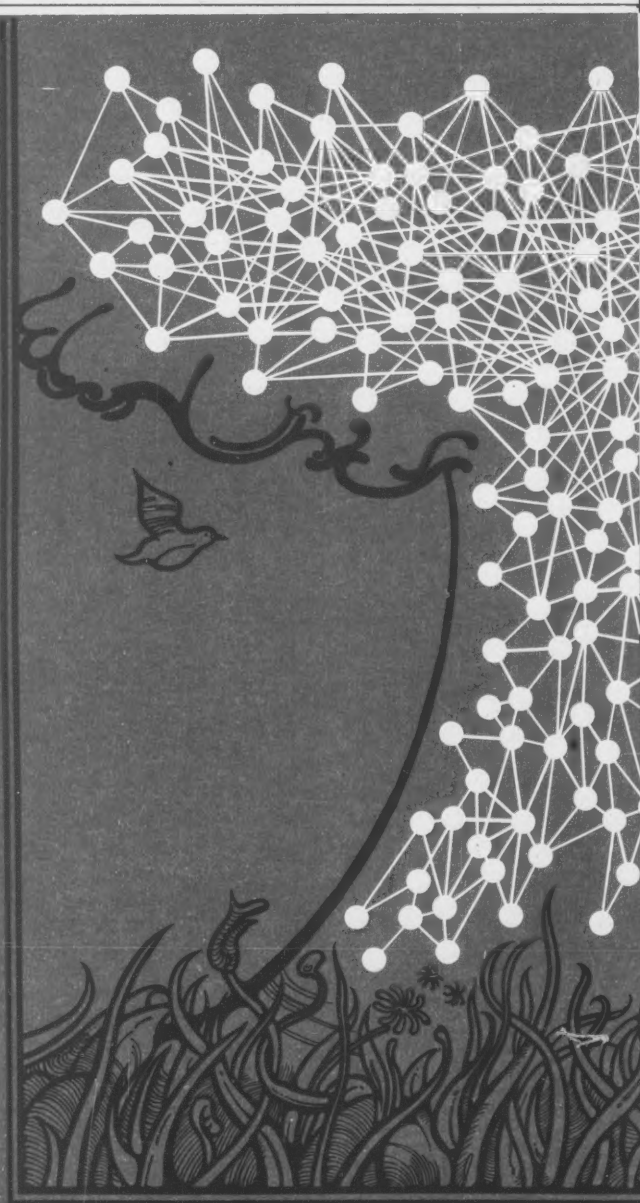
Two months later, the same graph was produced and it showed the progressive improvement in actual personnel assignments. So the user and the data base specialist had the pleasure of carrying the new graph upstairs to the user's manager.

The trust they had established allowed two things: One, the user was

protected from exposure during the time necessary to improve the personnel assignments. Two, the data base and graph were shown in this process to promote more effective management. The user trusted that the system could help him manage and also help him demonstrate his improved performance to his superiors. And the specialist trusted that the data base and graph would be used, after the two-month delay.

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to his management, the user was taking action on the basis of what he had seen on the graph. In other words, he was using the data base as justification for his own political actions — actions that had consequences in his personnel staffing decisions.

Seduction Process

The success of a data base implementation is determined by the user's acceptance of the data base con-

tent as fact. Data base specialists devote much of their efforts to bring about this acceptance. The data base analyst and designer work to ensure the accurate and complete fit of user activities and records into the data base. Data base administrators work to ensure the integrity, security and accessibility of the finished product. After taking whatever measures are needed to reach this assurance for himself, the data base specialist invites the user also to be assured. This

effort can be understood as a process of seduction.

From initial data analysis to loading and auditing the content, reports and tests are run to assure the user of the data's quality. These reports, tests and audits both assure and seduce the user. The assurance is there because the system facts are — the system works. The seduction is there because the user sees the system working in his interest, generally through demonstrations that high-

light the most desirable, sometimes dazzling, features.

In the relationship between user and data base specialist, it is the user who determines funding, sets deadlines and approves the result. In other words, the user has more relative power. Seduction is what you do to gain some measure of control in a situation where consent is the prerogative of others. This fact determines the political behaviors and options available to the data base specialist.

Negotiating Tools

In practice, negotiation has become a primary tool. The process of negotiating is stepwise, from the general to the specific.

The bargaining commodity used by a data base developer in negotiating the control needed to implement a system is accountability. Simply stated, accountability is taking responsibility for satisfactory work. The specifics of accountability outline the agreements as to the size of the task, time constraints and standards of acceptance. In return, the data base development team gains control in the form of resources, authorizations, hardware and so on.

The negotiations at the beginning of a data base project start with the user's expectations, the data base specialist's reputation for good work and industry conventions and precedents with respect to how much control the data base team needs to get started. At first, the data base developer usually needs to agree only to tokens of accountability, such as budgets and estimates.

As development proceeds, he will need more control. He uses more specific instruments of accountability to gain it. The logical model of a data base (or external functional specification) is a significant political bargaining, or negotiating, tool. The data base design team must use this tool to ensure that they will gain sufficient control in the next phase of development.

The logical model or functional specification is the basis for a deeper level of mutual trust, when accepted. Negotiation for control is then conducted in terms of the specifics of the next development phase — schedules, staffing, hardware or software purchases, budget additions. All of these can give the necessary control to the project team, when approved.

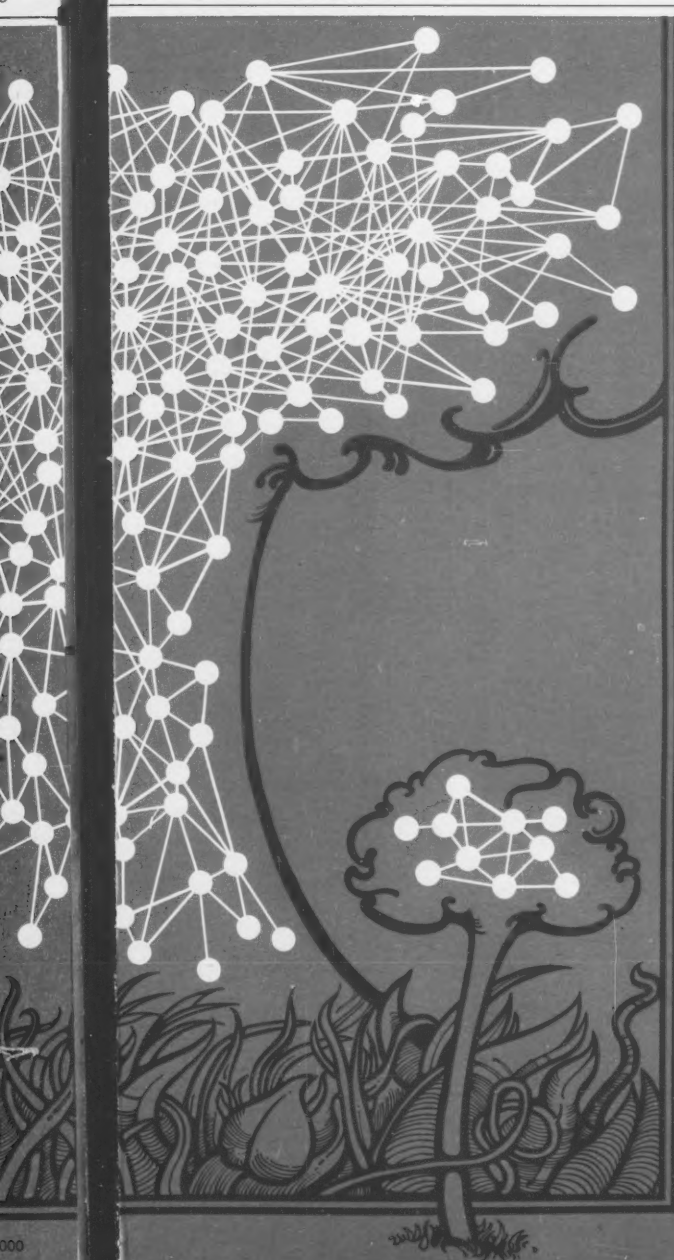
Some common techniques of gaining (negotiating) these approvals are:

- Empathetically involving the user in defining tasks and estimating time.

- Convincing the user that the rational basis of the design and development plans has been accurately portrayed.

- Demonstrating the data base team's interest in furthering the goals and profits of the user's organization.

Thus, data base development proceeds from logical model to physical design, on through prototyping and



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testing to full-scale loading. The trust gained by the successful completion of one development phase is what makes the negotiations in the next phase possible. The negotiations always provide control for the project.

In addition to control, the data base analyst needs knowledge about the user's business activities and records in order to develop specifications and system designs. The analyst gains this knowledge by acting as if the self-interest of the user is synonymous with his own. In this way, the data base analyst persuades the user to state his requirements.

Like negotiation for control, the process of transforming user requirements into data base design is stepwise, from the general to the specific. Periodically, the data base design team demonstrates to the user their understanding of the requirements and how these requirements appear to fit into a design. Then it is agreed to proceed to more detailed design, programming or whatever is the next step.

To the extent that a successful fit has not yet been demonstrated, the user must trust the data base designer, and the designer must bear some of the anxiety that it might not fit. Formal methods of representing requirements and designs (such as data flow diagrams, data dictionaries and structured English) are constantly being invented. These representations are a basis for mutual understanding, but they are only a part of the overall working partnership, in which the data base specialist is advancing the user's goals.

A very effective representation is the prototype data base, not only because it brings out substantive questions, but also because the prototype is almost as rich as the final version in its ability to bring out and resolve anxieties about the transformation of requirements into design.

Performance Opportunities

Besides a degree of control and a knowledge of user requirements, the specialist needs his own skill in order to develop or maintain a data base. Skill in job descriptions is usually given in technical terms: a specific number of years' experience with a certain computer, DBMS or language. Political qualifications are hinted at in phrases like "communications skills" or "service-oriented."

The political role of technical skill always exists in relation to other people. A data base administrator's technical skills have a political role in relationship to many different groups. In other words, there are many opportunities for political performance:

- *With users.* A DBA identifies with the user's interests and gains his trust. The DBA's technical skill is measured in terms of its justification of that trust.

- *With DP personnel.* A DBA's skill serves to increase the prestige of the department and its management. A

senior DBA may also act as mentor to junior analysts and programmers. A DBA transmits to team members the political elements of his role, leading them to act as if the self-interest of the user is synonymous with the self-interest of the team. The political consequence of the DBA's skill for those who work with him is their career advancement.

- *With computer operators.* A data base brings the extra problems of large files, recovery and backup pro-

cedures and high demands for performance. On the other hand, the DBA's exercise of skill brings meaning and interest to the role of computer operations.

- *With vendors.* A DBMS vendor is interested in the skill of the DBA. Successful implementations enhance the reputation of the DBMS and the industry as a whole. One political consequence is an increase in sales.

These activities are expressions of skill, and the consequences of those

skills are determined by their political roles.

Today, there is progress toward more user-friendly DBMS packages. This is being accomplished through more sophisticated hardware and software. The skills of programmers and analysts are being prepackaged, and it is becoming easier for the user to work directly with a data base.

The extent to which standard packages can meet the user's requirements depends largely on how rich

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IN DEPTH

in content software can be. Users share certain potential misunderstandings. Generalized applications take care of general misunderstandings. But every user has individual misunderstandings about the data base. The challenge to user-friendly software (and artificial intelligence) is not in the features or size of the vocabulary but in the richness of content needed to resolve these individual misunderstandings.

A user's misunderstandings are of-

ten related to the technical elements of the data base — terminals, query languages, data relationships and so on. It is the responsibility of the data base specialist to find a resolution to these misunderstandings. If the user could understand his information in its old form, he can be taught to use the conventions of the new form. Reconciling the difference between the old form and the newer form presented by the data base is a political activity comprised of, at least in

part, the points I have discussed. They can be summarized as follows:

1. Technical skills serve the political interest of a data base specialist by justifying the trust of the user, by advancing the specialist's career and by enhancing the reputation of the DBMS. Technical skill alone, even if highly developed, does not make for a successful implementation. Given two data base people of equal technical skill, the more competent one will be the one who sees accountability as an opportunity

for reward, not a threat.

2. A data base design is developed after an analyst has obtained clear and complete user requirements. A competent analyst will know what to ask a user, what requirements are meaningful and when to stop. He must know how to handle the content of user requirements — the self-interest of the user, the detailed facts themselves and the anxiety that accompanies those facts.

3. A negotiation for control of a data base is gained by an exchange of accountability for the degree of control acceptable to both parties. The data base specialist must make an accurate assessment of the amount of control necessary for the successful completion of each project phase. A failure in this assessment can create a dangerous and stressful imbalance. When the user is not given enough accountability or the developers are not given enough control, a data base project can fail. This is also the consequence if the specifics of accountability are used dishonestly or improperly, undermining the user's trust.

4. An implementation depends on the user's acceptance of the data base content as fact. It is up to the data base specialist to assure the user of this. The basis of this assurance is a mutual trust. One token of this trust is that both parties agree that the DBA is to be the custodian of the facts. A successful data base is the result of a transformation wherein the user — as he did with the previous system — takes facts from the data base and uses them as a basis for decisions.

In a manual system where armies of clerks perform the tasks of data storage, processing and retrieval, each person bears a small portion of the work and responsibility. It is understood that they are working in the interest of their management, the user. But the tasks and concerns are dispersed, and the pace is determined by human limitations.

A large data base application focuses all of these activities and concerns. A development project must prepare to handle the technical and political factors that were formerly dispersed and to handle processing and reaction times much faster than used to be humanly possible. This concentration of effort creates challenging and interesting opportunities for data base specialists.

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Offers 602M Bytes

DG 32-Bit Eclipse Gets High-End Winnie

WESTBORO, Mass. — A high-end Winchester disk drive that offers up to 602M bytes of storage and interfaces to computers through a single-board controller has been introduced by Data General Corp. for its 32-bit Eclipse systems.

The disk drive is said to more than double the present storage capacity of DG MV/6000 and MV/8000 systems for virtually the same cost.

The firm also announced that it has extended the availability of its Model 4307 6,250 bit/in.

magnetic tape subsystem to its 32-bit computer family.

DG's high-capacity disk subsystem increases the maximum on-line storage of the MV/6000 and MV/8000 systems to 6G and 7G bytes, respectively. Previous limits were 2G and 4.3G bytes, a spokesman claimed.

The disk drive interfaces to the computer's high-speed burst multiplexer channel through a single-board controller, which reportedly reduces the number of interconnects and simplifies the cabling nec-

essary with previous disk units.

The controllers incorporate a comprehensive set of diagnostic commands, supported by DG's diagnostic software. They also have a test and diagnostic unit that isolates various fault conditions in the drive, according to the spokesman.

Each controller can handle up to two disk systems, the spokesman added.

The drive operates with single-phase ac power and is fully supported by DG's AOS/VS operating system and recently an-

nounced AOS/Real Time 32-bit software. The unit costs \$50,000, with add-on drives priced at \$45,000.

GCR Format

The Model 4307-H tape subsystem operates under the IBM-compatible group code recording (GCR) format. The GCR format uses high recording density and smaller interblock gaps to increase the amount of stored data per tape reel, the spokesman explained.

The subsystem is supported as a file I/O device by DG's AOS/VS operating system and includes the transport, control board, formatter and cables. It also connects to the MV computer's burst multiplexer channel.

The price for the Model 4307-H is \$48,500. The add-on Model 4307-A — minus the control board and formatter — costs \$43,500.

DG's Information Systems Division is located at 4400 Computer Drive, Westboro, Mass. 01581.

Cache Disk System Out for IBM ACP

CHATSWORTH, Calif. — A fixed-record-length cache disk memory system that is said to enable users of IBM's airline control program (ACP) operating system to access quickly data stored on disk drives has been introduced by Amperif Corp.

The Model 5070 cache disk subsystem was designed to interface to the ACP fixed-block architecture and reportedly allows all operations and requests for read or write data to be routed through cache to the system's disk drives. The system is targeted for airlines, hotels, financial institutions, car rental agencies and freight carriers.

The disk system is logically placed between the host computer's block multiplexer channel and the IBM 3330 disk storage control units, eliminating the mechanical delays common to most disk systems, a spokesman said.

The cache offers three different modes of operation: full caching, for both read and write functions; write-through, for writing data directly to disk and then into cache for subsequent access; and bypass, for processing read and write data directly from the disk subsystem.

Any of the modes can be selected by individual disk addresses via an operator control, reportedly without interrupting the system's operation. In addition, the system can be

physically bypassed to allow the host channel to interface directly to the disk control unit for testing and maintenance, the spokesman noted.

The Model 5070 uses 64K-bit random-access memory chips and is offered in four memory sizes: 2M, 4M, 8M and 16M bytes. The unit's data transfer rate at channel speeds is up to 1.5M byte/sec and its interfaces

are compatible with IBM 3830 and 3880 control processors.

With one control processor, 4M bytes of cache memory and four channel interfaces, the device costs \$162,800 and can be leased for \$4,095/mo. Deliveries are scheduled to begin the fourth quarter of this year, the spokesman said from the firm at 21345 Lassen St., Chatsworth, Calif. 91311.

Automates Documentation

McAuto Unveils Interactive System

NEW YORK — McDonnell Douglas Automation Co. (McAuto) introduced an interactive graphics system here last week designed to automate structured systems documentation.

Called Stradis/Draw, the system includes a Tektronix, Inc. 4113 intelligent eight-color raster terminal, a Tektronix 4632 hard-copy unit and Stradis/Draw color graphics software. It operates on an IBM 370 under the MVS operating system and TSO software, McAuto said.

According to the company, the system software allows users to draw two-dimensional diagrams with text and contains all 22 graphics symbols needed to construct data flow diagrams, system structure charts and free-form diagrams. It will support California Computer Products, Inc., Versatec, Inc. and

Tektronix plotters.

Either Stradis, McAuto's proprietary systems development software, or another structured methodology is required to use Stradis/Draw, McAuto said. However, nonstructured diagrams can be created with the graphics system, according to

the vendor.

The Stradis/Draw system is priced at \$60,000, which includes one year's software maintenance. It is currently available. More information can be obtained from McAuto, Department K277, Box 516, St. Louis, Mo. 63166.

Graphics Workstation Bows

WHIPPANY, N.J. — HAI has introduced the HAI-Graph, a stand-alone workstation designed for graphics requirements.

The workstation features production graphics, business graphics and slide development capabilities. Users' data can be locally entered, manipulated and analyzed. Automatic data

downloading from host computers or remote data sources is also available, the vendor said.

The system is based on Chromatics, Inc. CG series Colorgraphic terminals and uses software from HAI.

The workstation is available for \$17,170 from HAI, 20 Parsippany Road, Whippany, N.J. 07981.

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Nicolet Zeta Debuts Pair of Graphics Plotters

CONCORD, Calif. — Nicolet Zeta Corp. has introduced two graphics plotters, an eight-pen tabletop model and a four-pen intelligent plotter that has a speed of 20 in./sec.

The tabletop Zeta 8 uses eight capped pens on one microcomputer-controlled carriage instead of the

standard one-pen approach that involves having pens stored individually at the side of the plotting surface. The device operates at 20 in./sec and features a character style similar to the group of Helvetica-based typeface used in typesetting applications, a spokesman said.

The Zeta 8 supports English or metric continuous-feed media and can plot on translucent paper, vellum, glossy bond and clear acetate. Pens can be nylon tip or liquid roller and are capped when not in use to prevent drying out.

The compact plotter is RS-232C- and IEEE-488-compatible and offers user-selectable data rates ranging from 110 to 9,600 bit/sec. First deliveries are scheduled for July.

The Zeta 3610 intelligent plotter has a drum size of 36 inches and incorporates a linear-actuator pen system that allows the operator to adjust individual pen pressures, the spokes-

man noted. Standard features include windowing, programmable pause, electronic margin limits, next plot and grid scaling. The plotter operates with most computers and protocols including IBM's systems network architecture and synchronous data link control. It also only responds to uppercase, printable ASCII characters.

The Zeta 8 costs \$5950 while the Model 3610 sells for \$25,900 with the firm's integral C53 controller or \$23,900 without.

Nicolet Zeta is located at 2300 Stanwell Drive, P.O. Box 4003, Concord, Calif. 94524.

Model 4544 Printer Offers Two-Color Print Method

GREENWICH, Conn. — Facit, Inc. has announced a color printer that offers two color printing methods and incorporates a patented nine-hammer print head.

The Model 4544 can produce black, blue, green or red, or provide black, cyan, magenta and yellow, which can reportedly be combined to create any hue in the color spectrum — Color changes are performed instantly, a spokesman said.

The unit features Facit's Flexhammer print head, a stored force device that has nine hammers mounted directly on magnet armatures. Coupled with the 4544's four-color printing capability is a gray-scale mode. Ten different shades can be printed to distinguish different fields of interest. The device prints alphanumeric characters within an 8 by 14 matrix in either a 10 char./in. or proportional spacing mode. The printer operates at 250 char./sec or up to 535 char./sec with proportional characters.

The printer costs about \$5,000 from

the firm at 66 Field Point Road, Greenwich, Conn. 06830.

Scanners Fit Bell & Howell

RIVERSIDE, Calif. — BMS Data Handling, Inc.'s recently announced Series 770 optical data scanners are now compatible with Bell & Howell Co.'s discontinued MDR and IMR-80 optical mark readers, according to a spokesman for the firm based here.

The Series 770 reportedly offers editing and data formatting capabilities not formerly available to Bell & Howell users. It also supports asynchronous, synchronous and bisynchronous communications formats, allowing a range of systems integration.

The scanners, available in four models, are available immediately, with prices starting at \$7800. BMS is located at 12155 Magnolia Ave., Riverside, Calif. 92503.

Rotary Power Supply Out for DEC CPUs

LOS ANGELES — Computer Power Products, Inc. has announced a rotary uninterruptible power supply for Digital Equipment Corp. PDP-11/34, 44, 70, VAX, Decsystem 10 and Decsystem 20 CPUs.

The power supply combines the firm's brushless, synchronous motor generator with an off-line square-wave inverter and battery pack, the vendor said.

Systems cost from \$35,000, the vendor said from 2900 E. Olympic Blvd., Los Angeles, Calif. 90023.

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Color Graphics System Measures IBM CPU Performance

OTTAWA — A color graphics system designed to measure and plan the performance of IBM or compatible processors running under the MVS or VM/370 operating systems or communication networks has been developed by Technetronic, Inc.

The Copernicus 820 system consists of a 13-in. high-resolution color video monitor, a Digital Equipment Corp. LSI-11/2 processor, a keyboard with special function keys, 512K bytes disk storage and a digitizing tablet for menu selection of commands.

The system is attached via an RS-232 connection at the host computer system.

Prices for U.S. users range from \$35,000 to \$65,000, depending on modeling functions, a spokesman for Technetronic said from 325 Dalhousie St., 7th Floor, Ottawa, Ontario, Canada K1N 7G2.

Turnkey System Introduced

CANTON, Mass. — Perception Technology Corp. has introduced the Vocom Financial Information Reporting System, a turnkey system for financial institutions. The system includes application software, the vendor's BT-II Touch-Tone Entry/Voice Response Processor and a Digital Equipment Corp. PDP-11 minicomputer.

Graphics System Features Full-Color CRT Displays

MINNEAPOLIS — A stand-alone computer graphics system featuring full-color CRT displays has been announced here by Management Graphics, Inc.

The Business Graphics System features graphics built with data that can be retrieved directly from the data base, according to the vendor. It can provide raster-scanned video displays that allow visual analysis on sales, profits, inventory levels on other business figures.

The system includes both a black-and-white CRT and a 640-by-480-in. resolution color monitor, allowing the user to view the display as it is being created or modified. Using the dial-up telephone network to connect to a computer-driven slide-maker, slides and transparencies can be created with a full-color range, the vendor said.

The basic Business Management System with software sells for \$34,000, according to the vendor at 7336 Ohms Lane, Minneapolis, Minn. 55435.

System Interfaces With 3780 Hosts

LEXINGTON, Mass. — Distribution Management Systems, Inc. has released an enhanced version of its turnkey, on-line warehouse management system.

The DMS-1500 Version 2 is said to interface with bisynchronous 3780 host systems. The product provides for control of large warehouse environments handling finished goods inventories and consists of four integrated modules for order processing, inventory location and control, receiving and productivity analysis.

Features are said to include the ability to handle multiple warehouses on a single processor, serial number and lot controls, automatic cross-docking to fill back orders, multiproduct warehouse zone management, fast in-fast-out inventory management and accounting, order picking and shipping documentation production by customer, carrier, Zip Code or truckload.

Base price for the DMS-1500 is \$800,000. It is available from Distribution Management Systems at 81 Hartwell Ave., Lexington, Mass. 02173.

Printer Converts Data to Serial

FORT LAUDERDALE, Fla. — Southern Systems, Inc. has developed a Remote Printer Converter for remote printer operation in parallel mode.

Model 9135, which operates in conjunction with the firm's SI-9076 serial printer interface, is said to convert the parallel data to serial so it may be transmitted on standard serial communications channels.

The full- or half-duplex, two- or four-wire hookup converter features a switch-selectable transmission rate from 300 to 19.2 bit/sec in asynchronous operation, or synchronous to 55 KHz.

The unit costs under \$2,500 from the firm at 2841 Cypress Creek Road, Fort Lauderdale, Fla. 33309.

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The Beacon Color Graphics Computer System

'Beacon' Color Graphics Offers Multiprocessor Architecture

LAKE MARY, Fla. — Florida Computer Graphics, Inc. has introduced a color graphics computer system that offers a distributed multiprocessor architecture and comprehensive word and data processing and data communications.

Among the features of the Beacon system are a detached keyboard and a 13-in. raster-

scan color display; a 16-bit, bit-slice graphics processor; graphics memory; and seven interfaces for communications, according to the vendor.

It also offers 16 graphics and 16 alphanumeric choices on the monochrome displays that feature 640 by 480 pixel resolution.

The system is available for

approximately \$20,000 from the vendor at 1000 Sand Pond Road, Lake Mary, Fla. 32746.

Control Systems Get Tape Reader

WALTHAM, Mass. — GNT Automatic, Inc. has announced a paper-tape reader for numerical control systems.

The GNT 28 reader features an electronic buffer and can reportedly read tapes with transparency up to 80%. The device is unidirectional, can stop on a character and can read up to 1,000 char./cycle, a spokesman said.

The 19-in. rack unit is self-contained and incorporates a rewind mechanism. It is transistor-to-transistor logic or optional RS-232/V24 serial interface-compatible.

The firm is located at 1560 Trapelo Road, Waltham, Mass. 02154.

IBM 6670s Get Syntrex Link

EATONTOWN, N.J. — Syntrex, Inc. has announced an intelligent interface package for the IBM 6670 and 6670 Model II laser printers.

The interface reportedly allows users to link Syntrex's Aquarius workstations and Gemeni cluster filing systems with the IBM printer using IBM's Operator Control Language (OCL). It also allows font changes at any point in a document.

Users can print an original document in one font, additions and deletions in another. Boldface, underlines and superscripts are also available, according to the vendor.

The IBM 6670 intelligent interface costs \$7,500, the vendor said from 246 Industrial Way W., Eatontown, N.J. 07724.

Touch-Controlled UPS Introduced

CLEVELAND — Lortec Power Systems, Inc. has introduced its 2kVA uninterruptible power system (UPS) for data processing, process control, hospitals and other power applications.

The UPS system features a touch-controlled meter-function select panel said to enable the user to scan automatically or monitor manually dc voltage, battery current, bypass frequency, inverter frequency and output.

The system is available for approximately \$6,000 from Lortec Power Systems, 5214 Mills Industrial Pkwy., North Ridgeville, Ohio 44039.

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Vets Move Into 16-Bit Neighborhood

- Zentec's 16-Bit Micro Features Multitasking
- Dual-Processor Desktop Introduced by North Star

By Jeffry Beeler
CW West Coast Bureau
SANTA CLARA, Calif. — A nine-year-old supplier of intelligent terminals has branched out into the systems business with the introduction of a 16-bit multiuser microcomputer that can simultaneously handle up to six users.

The Series 2000's Zenix multitasking operating system, which is authored by Microsoft, Inc. and is a derivative of AT&T's Unix Version 7, supports users at the controller level. In other words, the hardware's workstation and disk systems controllers can reportedly operate concurrently with each other, with their CPU

and with a Multibus-attached peripheral, a Zentec spokesman said.

This concurrency, in turn, minimizes the Series 2000's response times and maximizes its throughput, he added.

Though aimed primarily at systems integrators and original equipment manufacturers, the Zentec product will also be sold extensively to large, sophisticated end users, who will use the equipment both in a stand-alone mode and as a node in distributed processing networks. End users will account for roughly 10% of the Series 2000's total projected sales, a Zentec official said.

(Continued on Page 119)

By Jeffry Beeler
CW West Coast Bureau
SAN LEANDRO, Calif. — A veteran microcomputer supplier here has entered the 16-bit computing realm with the introduction of a dual-processor desktop system that reportedly provides an upgrade path for users of the company's existing 8-bit products.

North Star Computers, Inc.'s Advantage 8/16 can reportedly communicate with the firm's older Advantage system through a local networking facility known as Northnet, which made its debut at the same time as the 8/16. Northnet also comes with data communications gateways that allow the

vendor's first microcomputers, the multiuser Horizon series systems, to operate in the same local networks as the two Advantage family members, according to a North Star spokesman.

The advent of both the Advantage 8/16 and Northnet coincides with a recent series of across-the-board price cuts that have lopped 24% from the cost of the original Advantage system and 17% from the cost of the Horizon configuration.

In a related development, North Star also announced the availability of an upgrade kit that reportedly allows the company's existing 8-bit Advantage system to be transformed into an Advantage 8/16 for less than \$500.

Built around 8-bit Zilog, Inc. Z80A and 16-bit Intel Corp. 8088 co-processors, the latest addition to North Star's product line runs the same software as IBM's recently announced Personal Computer, the spokesman said.

Use of the 5 MHz 8088 makes the 8/16 the only North Star (Continued on Page 120)

Qantel Accesses Rapid On-line Data

NEW YORK — MDS Qantel, Inc. made its move into the fast-growing 16-bit market recently by introducing a business computer system primarily for users who require access to large quantities of on-line data.

Called the System 64, the 16-bit system incorporates a 64-bit dual intelligence transaction processing system that Qantel said gives the system a performance rating of between .7 and 1.0 millions of instructions per second.

In its basic configuration, the System 64 includes 512K bytes of main memory, a terminal controller and a communications interface to facilitate on-line remote technical support.

The system operates under Qantel's Best/64 operating system and a special version of its Best/AOS operating system, the company noted. It also supports three programming languages,

which include Cobol, Real and Qantel's Qicbasic.

Up to 100 intelligent workstations can be supported by the System 64 as well as 2.5G bytes of disk capacity, 30 printers, eight data communication ports and Qantel's Best/Net local-area network, the company

said.

The basic configuration is priced at \$105,000, with deliveries expected in the first quarter of 1983, Qantel said. More information can be obtained from MDS Qantel Business Computers, 4142 Point Eden Way, Hayward, Calif., 94545.

Datamedia Unveils 16-Bit Multiuser

PENNSAUKEN, N.J. — Datamedia Corp., a manufacturer of intelligent and graphics terminals, has announced its first computer system — a 16-bit multiuser unit that is said to be compatible with a wide range of software and features integrated relational data base management software.

The Datamedia 932 is based on a Motorola, Inc. M68000 processor and uses Pick and Associates, Inc.'s Pick virtual memo-

ry operating system. It is reportedly the first implementation of the Pick operating system on the Motorola, Inc.'s processor.

The computer will make its official debut today at the National Computer Conference in Houston. It is primarily targeted at systems integrators, but will be available through third-party dealers, a spokesman for the firm said.

The Model 932 system has an

English-like data base query language capability and can run software that is compatible with Microdata Corp.'s Reality and Ultimate systems, Honeywell, Inc.'s Level 6 and Prime Computer, Inc.'s Information System computers, according to a Datamedia spokesman. The computer has a basic memory of 128K bytes that is expandable to 2.1M bytes of random-access storage.

(Continued on Page 118)

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DG SBS Division Unveils Winchester Subsystems

WESTBORO, Mass. — Data General Corp.'s Small Business Systems Division has announced two Winchester disk subsystems that are said to offer 150% more storage capacity for up to 54% less cost than current DG disk subsystems.

The Model 6220 Series consists of a 5M- and 15M-byte nonremovable disk system, each incorporating 8-in. disk drives. The systems are available with an optional 1.26M-byte diskette for backup and are compatible with DG's Micronova, Nova and Eclipse computers running under the firm's Mpos, Rdos and AOS software.

The subsystems include the disk drive, controller, power supply and cable. Extensive diagnostic logic is also reportedly incorporated into

the disk unit's controller to eliminate preventive maintenance.

The disk subsystems range in price from \$4,700 for a 5M-byte system for the Micronova to \$8,100 for a 15M-byte drive with 1.26M-byte floppy backup for Nova and Eclipse minicomputers.

DG is located at 4400 Computer Drive, Westboro, Mass. 01580.

Datum Adds Tape Backup For DG Minis

ANAHEIM, Calif. — Datum, Inc. has announced a streaming tape subsystem said to provide up to 92M bytes of backup storage for Data General Corp.'s Nova, Eclipse and emulating computers.

The DS12 combines a single-board tape adapter with Cipher Data Products, Inc.'s Microstreamer drive to back up Winchester fixed-media disk drives. The unit offers streaming capabilities at 100 in./sec and transaction processing at 25 in./sec.

The 1,600 bit/in. or 46M-byte version costs \$5,280 and the 3,200 bit/in. or 92M-byte version costs \$5,680 from the firm at 1363 S. State College Blvd., Anaheim, Calif. 92806.

Decision Data Adds Printer

HORSHAM, Pa. — A dual-head matrix line printer is being offered by Decision Data Computer Corp.

The printer operates at 300 line/min, and character density and line spacing can be selected either by the operator or by the system, the vendor said. It features an illuminated print area, vertical and horizontal alignment adjustments plus a pedestal equipped with a paper tray. There are no special furniture requirements, and cable through is a standard feature, according to the vendor.

This product costs \$6,995, a spokesman for the company said from 100 Witmer Road, Horsham, Pa. 19044.

Microdata Expands Reality Series With Midrange 40M-Byte System

IRVINE, Calif. — Microdata Corp. has expanded its Reality series business computers by introducing a midrange system that can support up to 40M bytes of disk storage.

The Model 4275 utilizes 64K-bit chip technology and incorporates the firm's recently announced Reflex II disk drive. It replaces the Reality 2510 and 4510 computers, which used the discontinued 15M- and 30M-byte Reflex I disk drives.

The Reality Model 4275 can handle up to

512K bytes of memory and can be field expanded to the Reality Models 6000 and 8000 machines, according to a Microdata spokesman.

Microdata reportedly unveiled the system to allow users a larger disk capacity without having to add additional disk units.

The Model 4275 costs \$37,975, the spokesman said.

Microdata is headquartered at 17481 Red Hill Ave., Irvine, Calif. 92714.

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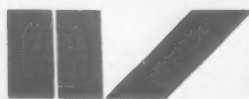
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Bubble Memory Announced for DEC LSI-11Units

DUBLIN, Calif. — The Bubbl-Tec Division of PC/M, Inc. has announced a high-density, magnetic-bubble mass-storage system that runs on Digital Equipment Corp. LSI-11 computers.

The bubble memory system is comprised of a dual-height controller module, called the QBI-11/02 and one or more dual-height bubble-memory modules, designated QBI-11, according to the vendor.

The QBI-11 bubble-memory module is built on the standard DEC dual-height format and contains 512K bytes of memory. A 256K-byte version is also available. Access time to the first data byte averages less than 41 msec and data is transferred to/from bubble storage at a rate exceeding 270,000 bit/sec, the vendor said.

The QBC-11/02 controller uses an on-board single-chip microprocessor to provide the ability to control up to 16 QBI-11 bubble-memory modules. The microprocessor handles bubble-device formatting and control, interfaces the bubble-memory system to the LSI-11 bus structure and provides for both soft- and hard-error detection and correction. As much as 8M bytes of bubble storage can be controlled by one QBC-11/02 module, the vendor added.

The bubble-memory system reportedly operates up to five times faster than a conventional floppy disk while consuming five times less power.

The QBC-11/02 is priced at \$749, while the QBI-11/512 is priced at \$3,787 with multiple purchase discounts available.

Bubbl-Tec is located at 6800 Sierra Court, Dublin, Calif. 94566.

Turnkey Mini Out for Bottlers

HUNT VALLEY, Md. — Display Data Corp. has announced the Series 8000, a turnkey minicomputer system aimed at the vehicle dealerships and the bottling/distribution markets.

Part of the firm's In Sight line of processors, a basic Series 8000 consists of a 64K-byte CPU, a 30M-byte Winchester disk drive, a CRT terminal, a 150 line/min printer and a communications modem for diagnostics and updates, according to the vendor.

The system is expandable to 240M bytes of disk storage, 256K bytes of user memory can support up to 40 users. All systems are field upgradeable, the vendor said.

Available software applications include accounting, payroll, leasing, vehicle management, parts inventory control and counter billing, repair order billing, general ledger, accounts payable and payroll, the vendor said.

Systems cost between \$25,000 and \$100,000, with an average system costing about \$45,000.

Display Data Corp. can be reached at Executive Plaza IV, Hunt Valley, Md. 21031.

DEC Mini Gets Semi Memory

SANTA ANA, Calif. — Standard Memories Division of Trendata Corp. has introduced an error-checking and -correcting semiconductor add-on memory system designed for use with the Digital Equipment Corp. PDP-11/70 minicomputer.

The Buscomm 70S is software compatible to all diagnostics and operating systems that support DEC systems, the vendor reported.

A 1024K-byte version has a list price of \$8,800 available from Trendata Corp., 3400 W. Segerstrom Ave., Santa Ana, Calif. 92704.

Two Winchester Products Unveiled For DEC LSI-11s

CAMPBELL, Calif. — Integrated Solutions, Inc. has released two Winchester disk products — a controller and a disk subsystem — that are compatible with Digital Equipment Corp.'s LSI-11 computers.

The Model RL101 Winchester disk controller supports up to four 5¼-in. Winchester disk drives using a Seagate Technology, Inc. interface, the vendor said. The Model RL/RL disk subsystem combines the RL101 controller with two 5¼-in. Winchester disk drives. The disks provide up to 20.8M bytes of formatted storage and emulate DEC's RL02 disk system.

They also feature built-in transparent error correction and a half-track

buffer that reportedly eliminates the need for sector interleaving, which slows down transfers and lowers system performance. Also included with the subsystem is a Q-bus 22-bit address support, an on-board formatter, bootstrap and internal diagnostics.

The single-unit price for the Model RL101 controller is \$1,750 with multiple-purchase discounts available. The price for one RL/RL subsystem is \$5,995, also with discounts available.

Further information can be obtained from Integrated Solutions, Suite 201, 1350 Dil Ave., Campbell, Calif. 95008.

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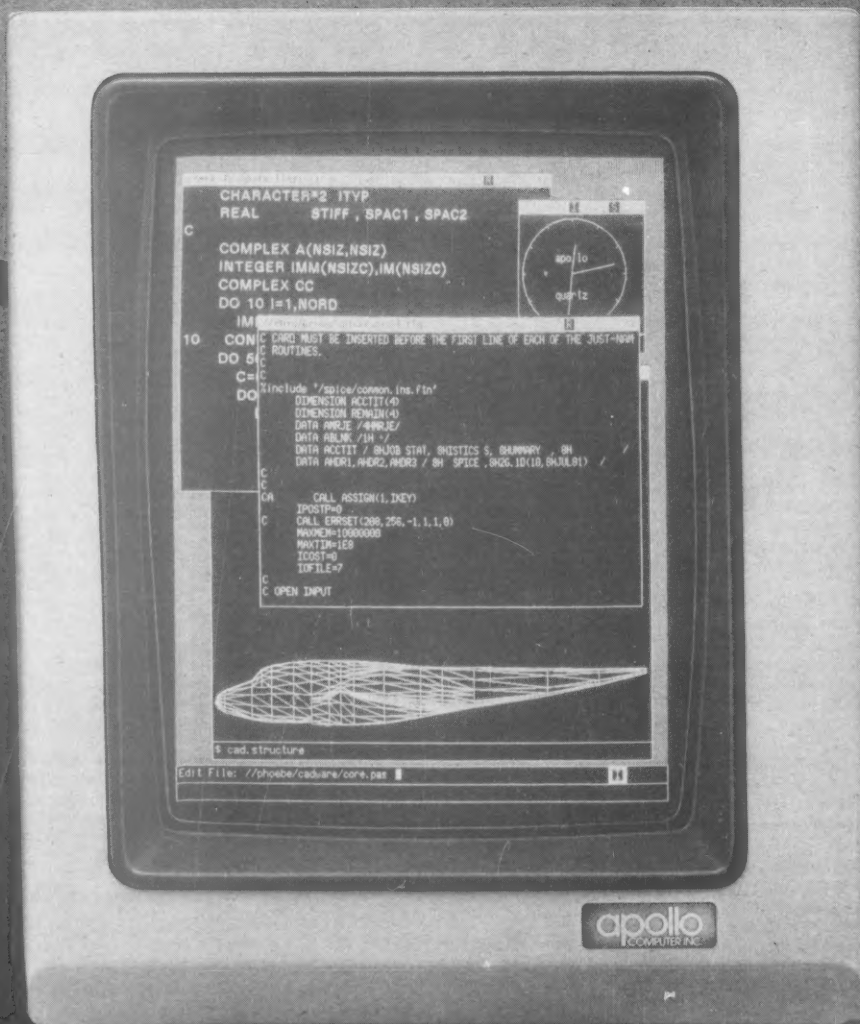
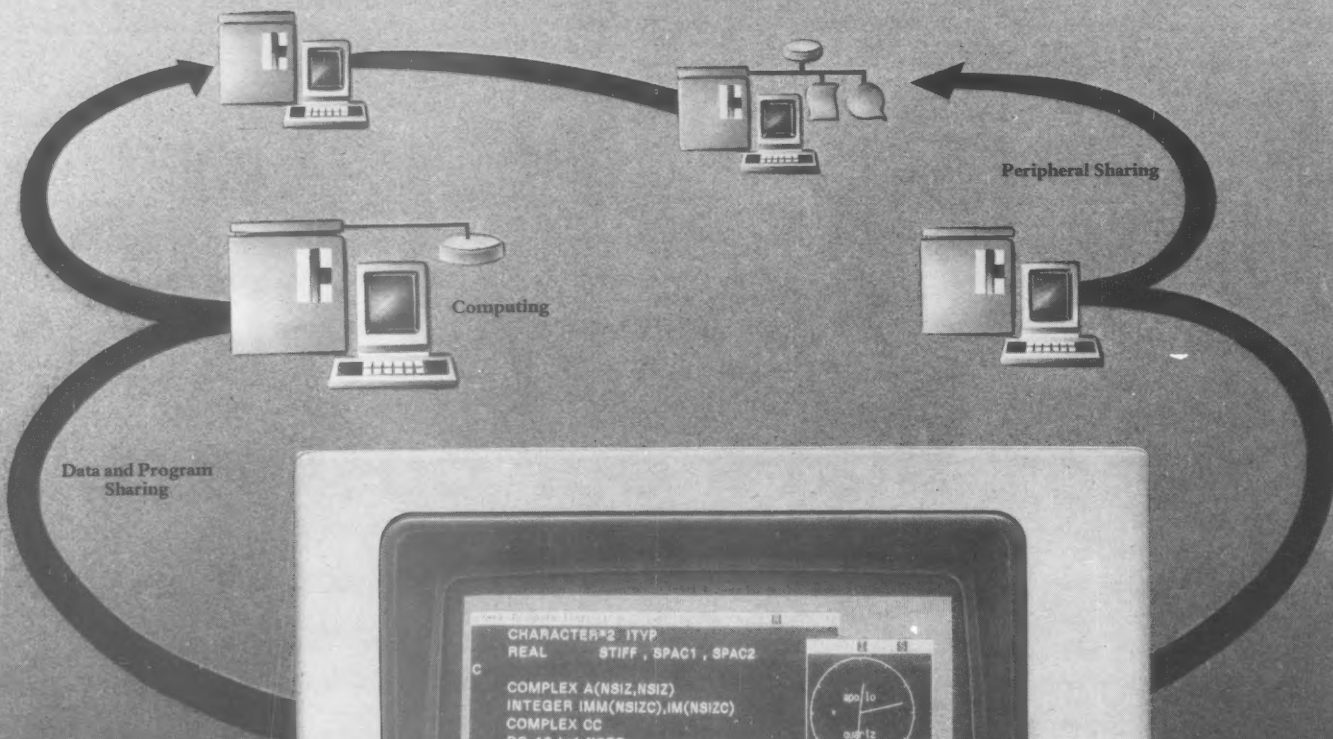
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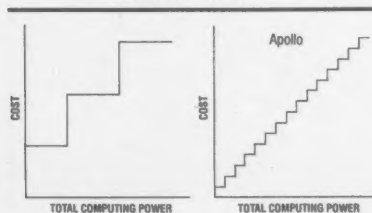
Processing Alternatives

| | BATCH | TIMESHARING | DOMAIN PROCESSING |
|----------------------------|-----------------------------------|--|--|
| Type | Large mainframe (e.g. Cray) | 32-bit supermini (e.g. VAX) | Networks of dedicated high performance computers (Only Apollo) |
| Typical Use | Very large computations | Interactive, real-time | Interactive and large-scale computations |
| Applications | Very heavy CPU-cycle applications | Multi-user, low to medium CPU cycle applications | Any number of users in heavy CPU-cycle graphics intensive applications |
| Typical Entry Cost | \$3,000,000 to \$8,000,000 | \$150,000—\$300,000 | \$35,000—\$50,000 |
| Incremental processor cost | \$3,000,000 to \$8,000,000 | \$150,000—\$300,000 | \$25,000—\$50,000 |

TACKLES THE BIGGEST JOBS

Each user's Domain system node has a 32-bit processor, 16 Mbytes of virtual address space, and up to 3.5 Mbytes of high-speed physical memory. That means you can run very large, single-program applications such as NASTRAN, circuit design simulations, architectural/electrical construction applications and many others. Or, with Domain's inter-process communications, you can run multiple program applications. Or, you can configure an entire network for running in a distributed multiprocessing way.

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Domain Processing reduces your initial system cost by allowing you to install only the computing power you need. Larger systems typically force you to buy expensive and wasteful excess capacity. A Domain Processing network is expanded in cost effective, manageable increments. With a large system, expansion usually means adding another expensive processor.

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memory operating system is geared to support Domain Processing's multi-level interaction.

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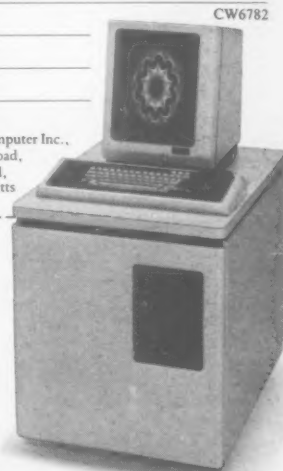
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With CSD Interface

Wang 2200s Linked to IBM 6670s

ALBUQUERQUE, N.M. — Computer Systems Documentation (CSD) has developed an interface to link Wang Laboratories, Inc.'s 2200 series computers with IBM's 6670 Model I or II laser printers.

The interface allows any

2200 application system to send its output to an IBM 6670 laser printer to be printed, the vendor said. Prior to printing a report, the interface system allows for sending an operator control language (OCL) file to the 6670 printer to select type font,

margins and other OCL-selectable options.

The interface handles and prints the status of the synchronous communications line and the IBM bisynchronous 2770 protocol status on the Wang 2200 screen.

CSD microcode and high-level software consists of the communications package, document editor and OCL editor, which can be used to send documents to the IBM 6670 printer.

The interface, priced at \$4,500, is available from CSD, P.O. Box 5478, Kirtland Air Force Base, N.M. 87185.

System Tracks Parking Tickets Until Disposition

NORTHBORO, Mass. — E.J. Matthews Associates, Inc. has announced a computer-based system designed to track parking violations for universities, factories and municipalities.

The computer-aided management of parking usage system (Campus) includes Xerox Corp.'s 882 microcomputer with CP/M operating system and Ashton-Tate's Dbase 2 software package.

Described as a revenue generating system, the system is said to provide for automatic tracking of each ticket from issuance to ultimate disposition. Follow-up features include 10- and 30-day delinquent notices, chronic offender lists and supplemental administrative reports.

Campus is priced at \$21,500, which includes hardware, software, installation and maintenance.

Further information is available from E.J. Matthews, 114 Pleasant St., Northboro, Mass. 01532.

Circuit Board Out for LSI-11

CLARENCE, N.Y. — Menen Medical, Inc. has announced the MMX-01, a multifunction circuit board for Digital Equipment Corp. LSI-11, 11/2 and 11/23 microcomputers.

The MMX-01 has a crystal-controlled calendar clock with battery backup. The board utilizes universal bootstrap programmable read-only memories (Prom) for the RL01, RL02, RX01, RX02 and TU58 disk and tape peripherals operating systems.

The unit comes with 16K bytes of erasable Prom and features Q-bus termination for the LSI-11 processor, the vendor said.

The board costs \$50, the vendor said from 10123 Main St., Clarence, N.Y. 14031.

IBM Personal Computer Gets Enhancements

BOCA RATON, Fla. — IBM's System Products Division has doubled the diskette storage capacity of its Personal Computer to more than 320K bytes, added programming and application packages and cut prices for two of the computer's attachments.

The programming aids include an enhanced version of DOS, a Basic language compiler and inventory control and accounts receivable application programs.

The Personal Computer Printer and 160K-byte Diskette Drive now sell for \$555 and \$450, respectively, at IBM Product Centers. DOS Version 1.1 by Microsoft Corp. supports up to two 320K-byte or 160K-byte Diskette Drives or a combination of the two.

DOS Version 1.1 costs \$40, the Basic Compiler costs \$300 and Inventory Control and Accounts Receivable by BPI Systems, Inc. each cost \$425. The IBM division can be reached at P.O. Box 1328, Boca Raton, Fla. 33432.

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"If it weren't for Intel's special OEM software concept, a small systems house like ourselves would never be able to take advantage of a product like SYSTEM 2000," says Warner. "Even though we're small, Intel treats us like we are one of their biggest customers. Support, training, documentation, all needs have been met immediately."

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GBC System 9 Gets Winchester Option

NORTHBROOK, Ill. — A 5M-byte, 5¼-in. Winchester disk drive option has been announced by the General Binding Corp. (GBC) for its System 9 small business computer.

The Winchester option will permit a range of applications programs to become resident on the 5M-byte hard

Vendor Bows 16-Bit Unit

(Continued from Page W)

In addition, it also has from 12M to 76M bytes of Winchester disk storage, from six to 16 terminal ports, 80M bytes of magnetic tape backup and two printer and one IEEE 488-compatible ports.

All of the system's asynchronous-only ports support both 20 mA current loop and RS-232C interfaces. Built-in disk and tape controllers are also capable of supporting up to four devices each, the spokesman noted. Finally, a battery backup is available to prevent data from being lost in the event of a power failure.

The Pick software, which has reportedly been in use on Microdata's Reality Series computers since the early '70s has an integral data base manager and an English-language query/report generator language that employs prose statements. The operating system is disk-based and can automatically shift programs and data between real main memory and virtual storage on disk using a least recently used algorithm, the vendor said.

The operating system's relational data base management software features:

- Sharing of data among multiple users and departments.
- Security and retrieval lock-codes to prevent unauthorized use of the system.
- Four dictionary-based hierarchical levels.

The processor-only system, including operating system software, costs about \$15,000. A six-terminal system is priced at \$22,000, or about \$3,660 per workstation. Shipments will begin this fall from the firm at 7401 Central Highway, Pennsauken, N.J. 08109.

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disk, eliminating the need for customers to handle individual floppies, according to the vendor.

This option costs \$3,355, a GBC spokesman said from One GBC Plaza, Northbrook, Ill. 60062.

Dual-Port Module Out for DEC LSI-11s

ANAHEIM, Calif. — A dual-port communications module for Digital Equip-

ment Corp. LSI-11 systems has been unveiled by Sigma Information Systems, Inc.

The SMF-V100 plugs directly into LSI-11-, LSI-11/2- and LSI-11/23-based systems and provides two asynchronous serial ports, a line time clock and a multidevice bootstrap, the vendor said.

The serial ports can be individually configured via address, vector and band rate switches. Each port is

jumper selectable for RS-232C, RS-422 or RS-423 operation.

The unit costs \$327 from Sigma, 6505 Serrano Ave., Anaheim, Calif. 92807.

Hard Disk System Fits IBM Micro

MOUNTAIN VIEW, Calif. — Davong Systems, Inc. has unveiled a hard disk system for the IBM Personal Computer.

The DSI-514 uses a 5¼-in. Winchester drive that fits inside the second floppy disk location on the Personal Computer chassis, the vendor said.

The DSI-514 reportedly provides 12M bytes of formatted or 14.3M bytes of unformatted storage capacity.

The system runs under IBM DOS. The \$2,695 price includes the drive, disk controller board, power supply, cabling and software to install under DOS. Davong is located at 1061 Terra Bella Ave., Mountain View, Calif. 94043.

Mini Bits

The advertisement is a black and white photograph of a woman standing behind a wooden produce stand. The stand is filled with crates of produce, including sunflowers and various boxes. A sign on the stand reads "ALTOS BRAND PRODUCE". In the foreground, there are two computer systems. The one on the left is labeled "Winchester Floppy" and has a price tag of "\$10,500". The one on the right is labeled "Winchester Mag Tape" and has a price tag of "\$12,990". The woman is sitting at a desk with a computer terminal and a printer. The background is a simple wall with a clock and some hanging items.

Zentec's 16-Bit Micro Features Multitasking

(Continued from Page 107)

In most large businesses, the 16-bit system will be installed independently in different departments. All the various systems will then be interconnected to form local networks that will operate on-line with a company's central host mainframe.

In performance, the Series 2000 belongs in roughly the same product class as systems from microcomputer ven-

dors like Altos Computer Systems, Inc.; Codata Corp.; Fortune Systems Corp.; and Onyx Systems, Inc.

'Unpersonal Computer'

Nicknamed 'The Unpersonal Computer' to underscore its close ties to Unix, the Series 2000 reportedly marks Zentec's first foray into the world of full-fledged systems. Until recently, the company had lim-

ited its business activities almost entirely to intelligent terminals.

The system is expected to make its formal industry debut this month at the annual National Computer Conference in Houston.

For typical applications, the Series 2000 bases its CPU on an 8 MHz Intel Corp. 8086 microprocessor, which requires at least 256K bytes of main memory and expands

to 1M byte. But for large number-crunching jobs, the system can also be equipped with an optional arithmetic coprocessor, built around an 8 MHz Intel 8087.

Additional Microprocessors

Whatever its constituent parts, the Series 2000's CPU is tightly coupled to at least two additional microprocessors, one for the system's workstation controller and

the other for its disk-unit controller.

The workstation controller supports up to six bit-serial RS-422 and RS-232C interfaces, which in turn can accept an equal number of terminals. Built around an Intel 8085A, the workstations can receive downloaded programs and hold 16K to 56K bytes of user memory.

The disk controller, meanwhile, supports up to four 5¼-in. external storage drives, including 738K-byte floppies and 5M-, 10M- or 15M-byte Winchester. Although only the 10M- and 15M-byte units boast an average seek time of 85 msec, all the Winchesters transfer 625K byte/sec, the spokesman said.

Both the workstation and disk-system controllers reside in the Series 2000's central unit and gain access to main storage through the configuration's memory management module.

The Series 2000 also provides a choice of compilers — a C compiler is standard — and dot matrix printers operating bidirectionally at 180 to 500 char./sec.

A Series 2000 configuration incorporating a 256K-byte CPU, 5M-byte Winchester disk system and one workstation costs \$8,950.

Deliveries of the system take 60 days from Zentec at 2400 Walsh Ave., Santa Clara, Calif. 95050.

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Integral data storage includes a choice of 8-inch floppy disks or magnetic tape backup option, plus a choice of Winchester hard disk capacities from 10, up to 80 Mbytes. A Multibus™ expansion interface

allows the implementation of Ethernet™ SMD mass storage, A-to-D converters, IEEE-488, digitizers and a 9-track tape drive.

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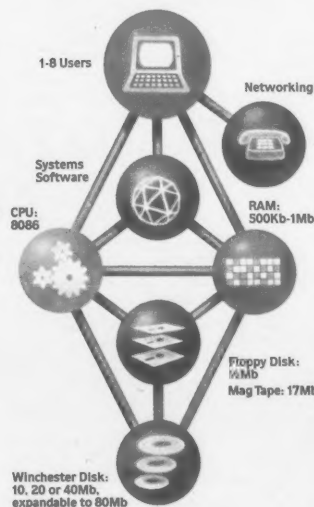
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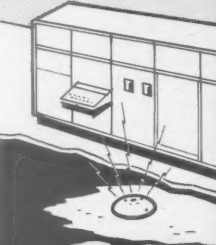
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Dual-Processor Desktop Unveiled by North Star

(Continued from Page 107)

system to run MS/DOS, a 16-bit operating system that also appears in a slightly modified form in the IBM micro. The 8/16 also reads IBM diskettes and most of the industry giant's screen attributes.

In addition to MS/DOS, the North Star system runs three 8-bit operating systems, including CP/M, Gdos/Basic and the company's own ASP product. All three control programs are available with the existing Advantage system and are driven by the 8/16's 4 MHz Z80A.

The 8/16's combination of Zilog and Intel microprocessors allows users of North Star's 8-bit Advantage

system to migrate to a 16-bit computing capability and yet protect their investment in existing application software, the spokesman said.

Equipped either with two integrated 360K-byte floppies or one floppy and a 5M-byte hard disk unit, the 8/16 belongs in roughly the same product class as the Apple Computer, Inc. Model III.

'Gateway' Capability

Though intended primarily as a stand-alone system for small businesses that demand quick access to a wide assortment of computing functions, the 8/16 will also prove suitable for very large companies. The system provides a "gateway" capability that allows microcomputers operating in different departments of the same firm to be linked both to each other and to central mainframes.

Any combination of up to 64 Advantages or Advantage 8/16s can be tied together to create a microcomputer-based local network. The glue for such a network comes in the form of the just-announced Northnet product, which reportedly operates with a 1M bit/sec bandwidth.

Northnet uses unshielded twisted-pair cable as its bus and combines a carrier-sense multiple access (CSMA) protocol with a positive acknowledgement (PA) capability known as Fastack. Together, the CSMA and PA features improve networking throughput by 60% to 65%.

Using Northnet as its communications medium, a collection of interconnected Advantages and Advantage 8/16s can reportedly operate independently of each other and yet share peripherals that otherwise might prove unaffordable.

Northnet consists partly of a Z80-based printed-circuit board that turns a stand-alone Advantage system into a communications workstation. The board, which plugs into a microcomputer's I/O bus, accounts for about one-fourth of Northnet's total \$1,565 price.

An Advantage 8/16 configured with 720K bytes of floppy diskette storage, a 64K-byte Z80A-based processor and a 64K-byte 8088-based coprocessor costs \$4,099. The 16-bit CPU can expand to hold up to 256K bytes of random-access memory.


A similarly configured 8/16 with a 360K-byte floppy system and an integrated 5M-byte hard disk unit costs \$5,499. The 8/16 upgrade kit, meanwhile, sells for \$499.

In the wake of North Star's recent price cuts, the cost of the 8/16's 8-bit sister system has dropped from \$6,599 to \$4,999 in a hard disk-based configuration. A similarly configured Horizon system has declined in price from \$5,999 to \$4,999.

Also affected by the price cuts are the floppy-based version of the original Advantage offering, the Horizon hard-disk upgrade and North Star's two existing 8-bit operating systems. All the price cuts were scheduled to take effect June 1.

Shipments of both the 8/16 and Northnet will begin during the fourth quarter from North Star at 14440 Catalina St., San Leandro, Calif. 94577.

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By Bruce Hoard
CW Staff

FRAMINGHAM, Mass. — Word processing users are more concerned with how WP features are implemented than they are with the features themselves, according to David Terrie, senior analyst for office automation at International Data Corp. here.

"Most of the vendors can come up with a nice looking checklist of features," he noted. There are only a few features that distinguish one word processor from another, Terrie said. Some he mentioned include superior records processing and better footnoting and revision tracking. He singled out Syntrex, Inc. for its column and table manipulation.

A great deal of attention has been paid to the quest for DP/WP integration. The senior analyst said the problem is that DP files usually have a fixed length while WP files vary in length. An example of integration would be producing a report on a word processor, pulling a DP file off a host computer and formatting the DP file to make it consistent with the rest of the report.

Wang can do it with its VS, OIS and Alliance product lines but IBM cannot, at least on its 8100 series, he said.

He said many companies that have lacked the ability to merge DP/WP files in the past are going through a "transition

period" that may lead to new capabilities.

The overriding concern of most WP vendors — and the area where there are currently the most announcements — is terminal emulation with IBM protocols, Terrie claimed. "They're all frantically trying to come out with 3270 emulation and they're talking up SNA. They want to be able to operate in the IBM environment."

He said desktop computer manufacturers

This is the first in a series of articles reviewing various office automation technologies. This week, word processing. Next week, electronic mail.

may pose a threat to WP vendors. They are improving their software and adding the CP/M operating system onto their word processors. Desktop user interfaces are still not as smooth as those offered by WP companies, but they are improving, he said.

It may not be long before some desktop computer offers a "very good" WP package utilizing "soft" keys because desktop computers do not have all the function keys found on word processors.

"The word processing people will have an edge to some extent for quite a while but that gap in terms of functionality is diminishing very quickly," Terrie said.

Standard Operating Systems Run Under Desktop Computer

MILPITAS, Calif. — Dynabyte Business Computers, Inc. has unveiled an office desktop computer said to be compatible with eight industry-standard operating systems.

The Monarch system reportedly combines an 8-bit Zilog, Inc. Z80B microprocessor with a 16-bit Intel Corp. 8086, both of which are implemented on separate printed circuit boards.

With the 6MHz Z80B, Monarch can accommodate a choice of three 8-bit operating systems, including Phase One Systems, Inc.'s Oasis and Digital Research, Inc.'s CP/M and MP/M II.

With the 8MHz 8086, the multiuser computer can also reportedly run five 16-bit operating systems, including Phase One's Oasis-16, Basic Four Corp.'s Business Basic, Bell Laboratories's Unix and two Digital

Research products — CP/M-86 and MP/M-86.

Monarch's combination of a Z80B and an 8086 allows users of Dynabyte's 8-bit Series 5000 systems to upgrade to a 16-bit computing capability without having to scrap or rewrite any of their existing application software.

A standard version of the system is said to incorporate nine RS-232C serial I/O ports and one each of the RS-422 and parallel varieties, with room available for an additional eight serial interfaces.

A basic Monarch system — the Model 6600 — incorporates 256K bytes of random-access memory, a 5¼-in. Winchester disk unit with 19M bytes of unformatted capacity and an 8-in. IBM-compatible diskette module that stores 800K bytes. That configuration, coupled with the standard number of I/O ports, can support up to five users, according to the vendor.

The Model 6600 entry-level system costs \$10,995, Dynabyte said from 521 Cottonwood Drive, Milpitas, Calif. 95035.

Modular WP Said Lowest Priced

ORLANDO, Fla. — A modular CRT terminal-based word processing system that is claimed to be the lowest priced on the market has been introduced by Technological International Corp. (TIC).

Priced at \$3,995, the Edit Pak system reportedly includes a 12-in. CRT, magnetic memory storage, a 40 char./sec letter-quality daisy wheel printer, a detachable keyboard, discretionary hyphenation, automatic wraparound and justification and WP software, according to TIC.

Optional communications and Telex interfaces are also available.

Availability is scheduled for July. More information on the Edit Pak is available from TIC, 9715 S. Orange Ave., P.O. Box 13457, Orlando, Fla., 32859.

Wang Amasses Dominant Share of Cluster WP Market

By Bruce Hoard
CW Staff

FRAMINGHAM, Mass. — Wang Laboratories, Inc. has amassed a dominant 47.9% share of the clustered word processing market largely because other minicomputer manufacturers "left them alone," according to David Terrie, senior analyst for office automation at International Data Corp.

"Nobody has really competed with them in the clustered arena until recently, so they have built up a huge installed base," Terrie said, adding that IBM did not get serious about the clustered WP market until the late '70s and early '80s when it started pushing the 8100 and 5520 models. IBM currently has 10.4% of the market.

Wang threw itself into the clustered WP market because it is more efficient to sell clusters and because the basic WP environment lends itself to logic sharing, something Wang does well, he observed.

'Relative Lack of Success'

Terrie blamed Wang's "relative lack of success" with the stand-alone Wangwriter on the fact that it is competing with older Wang products such as the System 5. He also said their sales force was not set up to sell stand-alone devices.

The other leading clustered WP vendors include Four-Phase Systems, Inc. with 5.2% of market share; NBI, Inc. with 4.6%; and Datapoint Corp., AB Dick Co., AES Lanier, Inc. and CPT Corp. all with 4.2%, according to Terrie.

Turning to the stand-alone WP market, Terrie said IBM commands a 31.3% market share over AES Lanier (10.1%), Xerox Corp. (9.1%), Wang (7.1%) Lexitron RDS (5.6%), CPT (4.3%) and NBI (4%).

OS 6 Taps 10% of Market

IBM had been maintaining about 10% of the market with its OS 6 system, which he said "was not that great for straight word processing." When the Displaywriter was introduced, IBM tripled their market share and now the firm plans to build on it, perhaps eventually turning it into a professional workstation along the lines of the Xerox Star, the senior analyst noted.

Asked what changes to expect in the stand-alone market, Terrie predicted IBM will continue to gain, possibly up to as much as 40% of the market. He painted a

(Continued on Page 122)

Mailbox Extends VMX Capabilities

NEW ORLEANS — ECS Telecommunications, Inc. is extending the capabilities of its Voice Message Exchange (VMX) with the introduction of its voice mailbox.

VMX is a digital store-and-forward system that enables users to communicate nonsimultaneously via telephone. Spoken voice messages are stored by the computerized system in each user's voice mailbox. Users can send, receive, redirect or reply to voice messages at their own convenience, 24 hours a day.

No installation of modems, monitors, hardware racks or special telephone lines is required.

Voicenet gives a company the ability to interconnect distributed VMX systems — either in one location or multiple locations — to allow users to send voice messages to other VMX users, independent of which VMX serves them.

With the use of group codes, a virtually unlimited number of individuals may be reached with one voice message.

A VMX 16, which handles up to 1,000 users, costs \$195,000; the VMX 64, which handles up to 3,000 users, costs \$525,000. There is a \$2,000 charge for installation of voice mailboxes, ECS said from 1241 Columbia Drive, Richardson, Texas 75081.

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On-Line Service Bows For OA

WASHINGTON, D.C. — Micronet Services, Inc. is offering an on-line office automation consulting service based on literature now being published in the field.

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The charge for the Office Automation Information Service is \$695/mo. In addition, the service will offer custom research and reports for subscribers at the fee of \$50/hour.

The service is located at Micronet at 2551 Virginia Ave. N.W., Washington, D.C. 20037.

Wang Dominates Cluster WP Mart

(Continued from Page 121)

less optimistic picture of AES Lannier's future, saying it has been dropping down somewhat as a result of a sales force that has not been able to meet the demands of the market.

Changes in the clustered WP market are difficult to predict because the participating minicomputer makers can all depend on their installed base of computer users to buy word processors, he said. "They already have a lot of big-dollar clients," he declared.

By the middle of the '80s, increased competition may have eaten away Wang's clustered lead, but the company will be happy to retain even a 20% market share, Terrie said. He did not foresee a market shakeout in the near future.

Word processors from different vendors are not compatible with each other, although there are some black boxes available that are 95% effective in linking the disparate devices, the senior analyst explained.

Along those lines, companies such as CPT and NBI — which are traditionally strong in the software area — will have to become plug-compatible with the total systems vendors such as Wang and Xerox.

SPONSORS: The Institute of Electrical and Electronics Engineers, Inc., IEEE Aerospace & Electronic Systems Society, IEEE Washington Section.

Hiring Slowdown Observed

Recession Arrives at DP Firms: CW Poll

By Robert Batt

CW West Coast Bureau

PALO ALTO, Calif. — Employees working for computer companies are being far more cautious about changing jobs while the economic downturn continues and computer vendors are taking greater care about whom they hire.

These are two of the major trends that emerged from an informal poll of 12 computer manufacturers carried out by *Computerworld* recently.

While only one of the companies interviewed (Digital Equipment Corp.) admitted to having imposed a virtual hiring freeze over the last few months, several

firms reported a cutback in their recruitment drives but reported they are continuing their efforts to hire highly skilled people.

Rod Asher, director of executive search at Executive Register Agency, Inc., an Encino, Calif.-based recruitment agency commented: "There are about the same amount of job offerings as usual but a lot of them are not as hot or as viable as normal due to the economic recession. Companies are not willing to pay as much for computer-related personnel as they have been and they are holding back on recruiting people, although this is traditionally a busy time of year for hiring."

Asher explained that the biggest impact in recruitment has been in the manufacturing sector, which has been more severely affected by the recession than, for example, financial services.

At DEC, for instance, a spokesman said that there had been a virtual freeze on hiring for the last two to three months. The only exceptions were for very highly skilled hardware and software engineers — this despite the fact that the company increased its operating revenues by 18% in the last quarter.

Many of the companies impacted by the recession are adopting tougher cost control measures. So, for example, while recruitment from college and university campuses continues, for some companies, this has been substantially curtailed. One observer pointed out that companies continue to recruit on college campuses to "keep the pipeline open."

A typical comment came from Andrew Borkin, manager of industrial relations, data systems group at Perkin-Elmer Corp. (PE). "We are adding and replacing people, but only in jobs that are deemed important such as in hardware and software design, but not in applications programming," he said. PE recently laid off 230 of its workers.

Not all companies are adopting this approach, however. At Sperry Univac, for instance, the emphasis is on hiring experienced applications programmers in environments such as manufacturing, the

(Continued on Page 126)

Burroughs Reorganization Reflects Market Emphasis

By Jeffrey Beeler

CW West Coast Bureau

SAN FRANCISCO — Burroughs Corp. late last month gained a new president and approved a corporate reorganization that underscores the vendor's growing emphasis on market specialization.

The election of Dr. Paul Stern as company president and the decision to revamp the firm to include an Industry Systems organization came during a May 26-27 meeting of Burroughs' board of directors.

Gathering at Burroughs' Memorex Corp. subsidiary in nearby Santa Clara, Calif.,

the directors reportedly accepted "with regret" the resignation of Stern's predecessor — DuRay E. Stromback — who plans to retire at year's end. In the meantime, Stromback will remain with the firm as vice-chairman and will continue to report to W. Michael Blumenthal, Burroughs chairman and chief executive officer.

Replacing Stromback as president, chief operating officer and board of directors member will be Stern, who has worked for Burroughs since January 1981 as executive vice-president in charge of engineering

(Continued on Page 134)

Europe Taking Long, Hard Look at IBM Practices

By Rex Malik

Special to CW

LONDON — The U.S. vs. IBM trial in the United States is over, but the investigation of IBM's alleged monopolistic practices in Europe continues.

In a previously undisclosed week-long, closed-door hearing that took place in Brussels the last week of February, IBM was given the opportunity to put its case verbally before the Commission of the European Communities of the European Economic Community (EEC).

The investigation of IBM's actions and policies in Europe began in 1974 by Directorate General IV (the competition direc-

torate of the EEC). Whatever may have occurred since then — and a lot has, most of it in private — the companies complaining have been reduced to two: Memorex Corp. and Amdahl Corp.

The issues have been so muddled by the lawyers that clarity is difficult to find. However, in the commission's view, there are four; in IBM's view, there are eight.

The four issues as seen by the commission are IBM's market dominance; its refusal to release interface information prior to first customer shipment of its new products; its bundling of a minimum quantity of main memory when it sells or rents a CPU; and its refusal to charge separately

for some basic software (the operating system issue).

It is the commission's case that IBM's dominance of the CPU and basic software market gives the company the power to influence or exclude competition in all other products used with them.

The IBM defense is that none of this is true. It offers instead eight issues, and bundles together under one of them the alleged abuses:

- The relevant market.
- Dominance.
- The alleged abuses.
- Remedies.

(Continued on Page 131)

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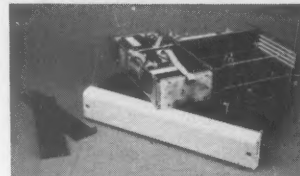
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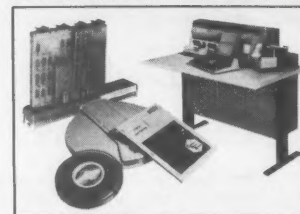
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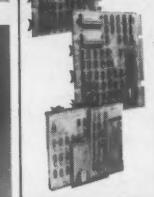
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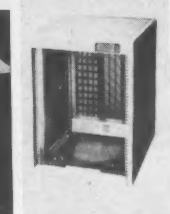
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| REV11-C | EXTERNAL REFRESH + BOOT I | 360 | 53% | 170 |
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| COMMUNICATIONS | | | | |
| DPM23-A | KDF11-AA, MSV11-DD, ISV11-B, BA11-NC, QJ642-AZ RSX-11S, QJ658-AZ, 120Vac | 11500 | 30% | 8050 |
| DPM50-FA | INTELLIGENT I/O SUBSYSTEM KDF11-AA, H333-A TEV11, MSV11-DD, ISV11-A, QJ642-DZ RSX11-S, QJ655-DZ, QJ658-DZ, 120Vac | 11450 | 30% | 8015 |
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| LA36-CJ | KEYBOARD DECWTR 240/50 20mA | 2970 | 80% | 550 |
| LA36-DE | LA36-DK W/20mA | 1835 | 70% | 550 |
| LA36-DK | LA36-DJ W/O CABLE 120/60 | 2695 | 80% | 535 |
| LA36-DJ | LA36-DJ W/ NO RIBBON, PAPER, CABLE, 240/50 | 2695 | 80% | 535 |
| LA36-HE | KEYBOARD DECWTR 120/60 EIA | 3080 | 80% | 615 |
| LA36-CE | REC ONLY DECWTR 120/60 20 mA | 2475 | 80% | 495 |
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| VT110-AA | DPM01-M + AVT100-AA, 120 Vac USA LINE CORD | 6325 | 50% | 3160 |
| VT52-AC | SOLD OUT SOLD OUT SOLD OUT SOLD OUT SOLD OUT SOLD OUT | 500 | | 500 |
| VT62-AC | 100/120 Vac, 50/60 Hz WITH EIA W CONT, 120 Vac | 3350 | 85% | 500 |
| VT100-NB | VT100-AB W VT1XX-PN DECFORM KEYCAPS, 240 Vac | 1945 | 23% | 1500 |
| VT110-AB | DPM01-MS + VT100-AB, 240Vac USA LINE CORD (50Hz) | 6325 | 50% | 3160 |
| VT55-FB | VT52-BB W GRAPHING CAPABILITIES, 220/240Vac 50/60 Hz | 5830 | 70% | 1745 |
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| MM8-AB | 16K X 12 MEMORY, G649 + H219-B, 1.5 μSEC | 3680 | 74% | 950 |
| MM8-EJ | 8K X 12 BIT 18 MIL. MEMORY, 1.5 μSEC | 2050 | 51% | 1000 |
| MRV11-AA | PROM/ROM MEMORY UNIT | 210 | 55% | 95 |
| MRV11-BA | PROM MEMORY UNIT | 390 | 55% | 175 |
| MS11-JP | 16K MOS MEMORY 11/04-34 | 3450 | 70% | 995 |
| MS8-CB | 32K 32 BIT MOS RAM, 4K CHIPS (M8417-BA) | 3850 | 66% | 1300 |
| MSV11-DC | 16K BY 16 RAM | 500 | 30% | 350 |
| MSV11-DD | 32K BY 16 RAM | 500 | 15% | 425 |
| MS11-FP | 8K 18 BIT MOS RAM (M7847-AD) | 2250 | 89% | 250 |
| MXV11-AC | 32KB RAM, 2 ASYNCH EIA SLU. SOCKET FOR 2-24 PIN 5V ROM (M8047-CA) | 750 | 30% | 525 |
| MM11-YP | 32K 18 BIT MEMORY, ONE 1" BOARD | 8500 | 78% | 1890 |
| MS11-LB | 128KB MOS MEMORY FOR 11/34A | 2400 | 30% | 1680 |
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| CMS11-JC | CM11 CONT, 120/60 CR04-K 1200 CPM CONSOLE RDR (DOC RS1200) + CD11 CONT, 120/60 | 11300 | 27% | 8250 |
| CTS11-JB | CARD TERM CONT, DECISION DATA 8010 RDR/PUNCH, ASCII, 8-BIT HOLLERITH | 5800 | 57% | 2500 |
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International High Tech

DPers Support Bill Reducing Trade Barriers

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Administration officials and DP and electronics company representatives told Congress recently that they strongly support proposed legislation to reduce international trade barriers in high-technology sectors, but several cautioned Congress not to exacerbate world trade frictions.

A number of bills have been introduced to focus government attention on the trade needs of high-technology and services industries and to give the President and his trade negotiators more authority to seek a reduction of trade barriers.

At a lengthy House of Representatives Ways and Means Committee hearing May 24 on several of those proposals, there was little disagreement about the need for the U.S. to support its high-technology industries more strongly, particularly in their dealings in world markets.

Representatives of organized labor, however, did argue that the administration already has all the trade negotiating authority it needs to handle these problems and suggested the pending bills are premature because not enough is known about their effects on domestic economy and employment and existing international trade agreements.

Cbema View

Testifying on behalf of the major American computer mainframers, Vico Henriques of the Computer and Business Equipment Manufacturers Association (Cbema) said the bills to provide the President with a "mandate to enter into international high-technology, investment or services negotiations ... make good sense in the context of traditional United States trade policy."

But he also suggested some of the legislative provisions could lead to U.S. regulatory agency enforcement of reciprocal trading arrangements, which might be seen abroad as unnecessarily punitive to foreign firms and might thereby jeopardize the decades-old General Agreement on Tariffs and Trade (GATT), the foundation for Western trade practices.

"A number of bills would permit the President to unbind tariffs in GATT and raise U.S. tariffs on certain newly developed competitive or high-technology products," Henriques noted. He said, "we believe this concept is extremely dangerous" because, he said, it would lead to retaliation by other countries.

Similarly, American Electronics Association (AEA) representative Rowland H. Thomas Jr., a Data General Corp. vice-president, said that "now is the time for the U.S. to do all it can to resist protectionism here and overseas by working to shore up the GATT system and to expand the system of international rules to cover foreign investment and services."

While supporting the congressional intent of the high-technology and services industries bills, Thomas said the AEA "opposes any legislation that would allow unilateral retaliation or require bilateral reciprocity outside the GATT on an industry sec-

tor or product basis. Such legislation," he said, "would fly in the face of GATT principles and obligations and would invite protectionism and retaliation here and abroad."

Semiconductor Praise

The Semiconductor Industry Association, represented by Charles E. Sporcik, National Semiconductor Corp. president, strongly praised the legislation's purpose to create a "political mandate and legal authority for negotiations" in the high-technology sector. The association, he said, would like prompt passage of the legislation.

Appearing on behalf of the admin-

istration, Deputy U.S. Trade Representative David R. Macdonald called the high-technology trade bills "immediately helpful to our efforts" to structure more equitable world trading practices for this sector. The legislation "recognizes the unique problems of technology-intensive industries long taken for granted in our international trade policy."

Macdonald's view, however, was strongly disputed by the AFL-CIO, whose head of economic research, Dr. Rudy Oswald, told the committee the services and high-technology sectors "are not two sectors whose parts have clear and common characteristics. They involve many differ-

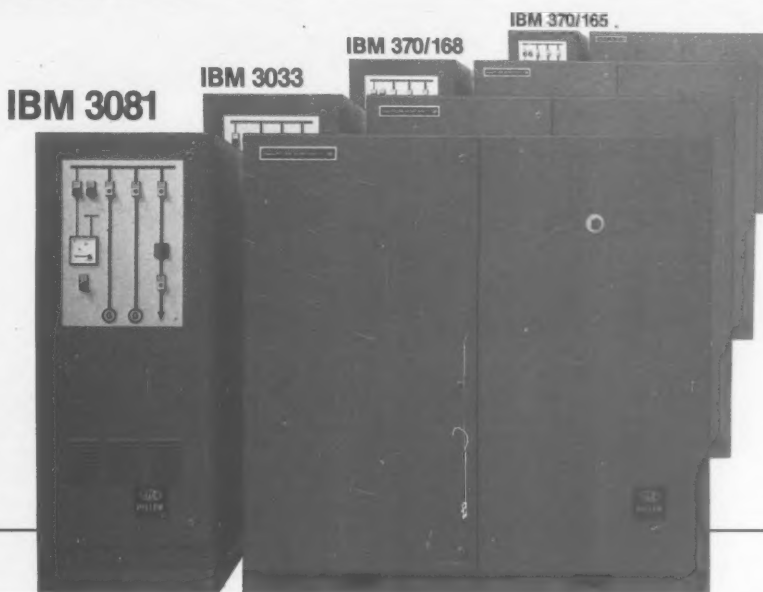
ent industries, products and problems," he said, adding, "in fact, they are not necessarily sectors at all."

Oswald said the bills "are premature. There is far too little understanding about the likely effects of international negotiations on services or high-technology products at home." He maintained the bills would give the President "virtually unlimited authority to affect the U.S. economy and its future through international negotiations."

Rather than give the President this "blank check," Oswald said, the government should take "practical steps to solve specific problems [that] can be taken now."

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Recession Changes DP Hiring Trends: CW Poll

(Continued from Page 123)

energy and chemical industries and in systems programming in areas that are traditionally difficult to fill such as microcode designers in engineering.

"There has been a switch in our emphasis due to the recession," reported John Kubeykas, employment manager at Sperry Univac. "We are concentrating on the highly skilled people. We want to know does the person have the exact expertise we require, rather than the situation which normally exists, where if a person has enough rounded experience we will hire him and train him in our specialist need."

The switch from a seller's market to a buyer's market means that companies have far more discretion than usual over whom they hire. This has

placed some pressure on headhunters who are now being called upon by vendors after they have failed to recruit the people they need through advertising or the holding of open houses.

Jon Kenneth, president of recruitment agency, Mallory Data Systems, Inc. in New York, commented: "Companies are looking for highly skilled, experienced people who can go in and get the job done, rather than the two-year experience guy who may require training. There are fewer jobs at each company so firms are taking their time about hiring people."

Kenneth sees a distinct trend over the last nine months back towards the client-oriented market of the ear-

ly '70s where the companies hold the upper hand as opposed to the applicants. "This is a very distinct trend," he argued, "and I don't see any break ahead. There are fewer jobs at each company and so they can afford to take their time about hiring people. They are being tougher with whom they hire, since they don't feel as much pressure to make immediate decisions."

The recession has brought in its wake some innovative methods by which management at computer firms have attempted to cut labor costs and improve worker productivity.

At Control Data Corp. (CDC), for example, a letter went out in early May from the company president, of-

fering employees the opportunity to take time off without pay for up to one year. CDC is hoping to find 700 people who will take advantage of this program. However, the company has made it clear that the people critical to its operations will not be selected for the leave program. At the end of last month, CDC reported that 696 employees had requested unpaid leaves. To date, the firm is still evaluating the applications, a spokesman said.

Data General Corp. has altered their average pay raises, reducing them by 2%, a spokesman said. DG said that it found its salaries were somewhat above those being paid by competitors and that the measure was part of its overall cost containment program.

Supershorts

IBM has named General Electric Co.'s instrumentation and communication equipment service department as an authorized distributor of IBM's Ascii terminals — the 3101 display terminal and the 3232 Model 51 keyboard printer. GE will lease the devices through its communications equipment leasing service. IBM also has begun marketing the IBM Data-master to qualified value-added remarketers. Under IBM's value-added remarketer program, which previously included only the IBM Series/1 minicomputer, the IBM product is enhanced by the remarketer with software or hardware and remarketed to unaffiliated end users. In return, remarketers purchase the equipment from IBM at a discount.

Graphic Resources Corp. has formed a new subsidiary, Universal Technical Graphics, which will specialize in the sales, service and leasing of refurbished plotting equipment.

Programs Unlimited, a computer and software retail firm, has launched its nationwide chain of franchised stores with the opening of outlets in West Palm Beach, Fla. and Cleveland.

Telos Computing, Inc.'s new product development division will specialize in microcomputer-based software. In addition to new products that the firm will market itself, Telos is seeking joint venture arrangements with microcomputer manufacturers and major distributors of business and office products.

Vector Graphics, Inc. has initiated a new electronic mail system, Dealer-net, for its nationwide dealer network as part of a new marketing strategy and enriched dealer support program. Dealers will transmit and receive on the network via their existing Vector demonstration microcomputers. Vector is also decentralizing dealer support activities by the establishment of regional offices in Atlanta, New York, Chicago and San Francisco. Vector has also announced that it will no longer distribute its computer systems through the Computerland chain of retail stores.

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BREAKTHROUGH

Enabling Breakthroughs

Communication 'Key' in Use of Technology

By Robert Batt

CW West Coast Bureau

SAN FRANCISCO — A new consulting company set up here recently is claiming to have tapped into a new method of systems design that could result in major productivity advances.

The company — Hermet — claims such advances will be made not by new technological resources or methodologies but through more effective communication.

Hermet is sponsoring a workshop around the country called the Communication for Action (CEA) workshop, based on the principle that the use of language can enable

us to achieve a breakthrough in our understanding of computers and enable us to deal with technology more creatively.

'Tools of the Future'

Fernando Flores, founder of Hermet and a former Chilean government minister and computer scientist, explained: "Computers are the tools of the future, but they are interpreted in a way that does not produce the power they really possess."

This is because people in DP are missing some fundamental questions about the nature of work and management, asserted Flores. "You cannot improve productivity if you do

not know what work is," he argued, "Electronic mail, for example, is communications not information. There is implicit today an identification between information and communication, which is really a mistake. People use and speak about the technology in a way that doesn't put the emphasis on creating."

When it comes to systems design, Flores maintained, there is currently no discipline of learning about what a system is. He argued that computer systems are designed out of a structure that is not purely technical.

Flores sees communication as the critical ingredient in the use of technology. In the CFA workshop, partic-

ipants examine why communication can produce value in interacting with the new technology; they examine the nature of the interaction between man and machines.

The workshop depicts organizations as a network of commitments and suggests that the key to effective management lies in the structure of communications.

Stan Head, manager of custom bipolar development at IBM in San Jose, Calif., commented: "During the workshop, I noticed that the way we use language in our company we create more discussion rather than results. I realized that in my management of projects there was a lack of direction and a fear of commitment to results."

Head claims that following the CFA workshop he became far more committed to attaining results within a specified period of time. Productivity increased and he was promoted to head up a new project.

"I now realize that I can attain my goals through the way I speak. My job is getting done at a level it didn't get done before and I'm more effective as a manager," he added.

'Network of Conversations'

The workshop recognizes communication as the critical tool in producing results within large organizations. Management is seen as a network of conversations. Communication is dissected into five component parts — promises, requests, acceptances, declines and counter proposals.

Hermet argues that by becoming clear on the tools to make observations clear, DPs, who have a reputation of being poor communicators, can in fact reveal their own communicative competence.

Take, for example, the case of Dan Ingalls, principal scientist at Xerox Corp. research laboratories in Palo Alto, Calif. Following his participation in the CFA workshop, Ingalls set up a three-month project to build a simple language interpreter.

The project involved both Ingalls and another researcher specializing in user interface design.

Ingalls noted: We were quite clear about our goal and the time period and I was able to outline the steps appropriate to achieve it. Armed with this specific information my colleague was able to say right away that he had a bad feeling about the project. We then worked out a counterproposal that met the same ends and about which he was enthusiastic. I figure we saved about a month of groping down the wrong path until we would have dropped it because it wasn't working and we probably wouldn't have had the energy to try the other approach afterwards."

Terry Winograd, professor of computer sciences and linguistics at Stanford University, concluded: "Through the CFA workshop Hermet is attempting to get people to go one step further in their thought processes and to ask the question — what is the domain in which computers operate? What do people need?, and, What tools can we come up with to provide it?"

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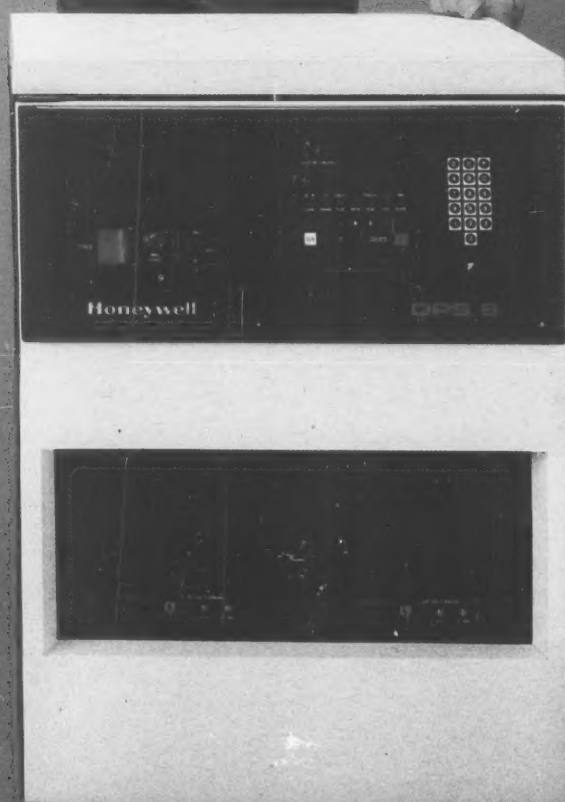
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IBM Enlists Washington in European Fight

By Rex Malik
Special to CW

LONDON — In an attempt to force the European Economic Community (EEC) Commission to drop its investigation and to forestall the commission from ruling against it, IBM recently tried to plead extraterritoriality, arguing that the moves the EEC was trying to impose on IBM ran counter to U.S. policy. The company fielded considerable help from Washington in its efforts.

All this occurred at a previously undisclosed week-long private hearing before EEC competition directorate, DG IV, which officials held in Brussels the last week of February. The hearings were unprecedented: No company has ever before been given

so much time to plead its case verbally.

The IBM hearings are probably the

Analysis

largest ever mounted by DG IV, certainly the largest investigation of a company. This investigation began initially in 1974.

The mechanisms are totally unlike procedures followed in the U.S., being much shorter. And they are non-judicial proceedings, unless and until the company decides to appeal to the European Court.

In practice, of course, if a company is not going to accept changes in its

policies and practices as proposed by the commission, it immediately wields its lawyers and prepares its defense as if it were going to court. For it knows that unless it can get the commission to withdraw, court is its last resort.

Heading for Court?

IBM has been preparing throughout as if it expects to end up in that court. Its written defense, an onslaught on the commission's proposals, is in three volumes of over 900 pages, in which it disputes everything from the commission's facts to the findings and to the way in which the commission has carried out its investigations.

IBM's extraterritorial defense took

the form of getting Washington to send a diplomatic note, saying that the measures complained of in Europe had been adjudged legal in the U.S.; that if IBM was forced to change its policies in Europe, this would affect conditions of competition in the U.S. and therefore the U.S. government requested the presence of an observer; and that, further, it wished to enter into discussions with the EEC before any rulings were enforced.

The observers, Sherman Unger, general counsel of the Department of Commerce, and an aide, were given observer status at the hearings. Unger used the opportunity to lobby the commission privately and also to state publicly that the EEC should drop its case.

IBM also wielded former Secretary of State Cyrus Vance in its defense. Vance tried to show, as did Jeremy Lever, IBM's main European counsel, that the rules of international law were such that the EEC was precluded from taking the measures it sought.

No Force of Law

Legal clarification during the hearings pointed out that the recommendations do not have the force of law. The notion that taking measures to change IBM's behavior would seriously impact on American technological investment in Europe was discounted. And the commonality of purpose between IBM and Europe against the Japanese, which was implicit in much of the IBM testimony, was seen as being arrogant.

By mounting this sort of onslaught, IBM is seen here as having seriously misplayed its hand. The talk in commission circles is that it has ensured that the commission does not drop the case.

Europe-wide competition policy here does not have the long history of U.S. antitrust law. The dropping of the case would be seen as opening the door to other multinationals to behave as they thought fit and to plead their native competition policy as having a preemptive right over Europe's.

This case is now going to drag on for another two years, commission sources expect, and unless there is some quiet negotiation between Washington and Brussels, that the case will help to poison European-U.S. relations is quite likely.

What could the commission do? If it finds that the IBM policies were anti-competitive and if it rules against IBM and if those complaints are upheld by the European Court, then the commission can fine IBM up to 10% of the previous years' revenue. For the companies of IBM Europe, that would probably be well over \$600 million. But nobody expects that to be the outcome.

The commission can also fine IBM up to \$1,000 a day on each infringement of Article 86 of the European Treaty, the article governing this part of competition law. This would be from a date fixed at the end of the case, which in the past has usually been the date of the final judgement. And that daily fine continues until the policies complained of have been brought to an end.

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Europe Taking Long, Hard Look at IBM

(Continued from Page 123)

- Due process.
- The U.S. legal position.
- International law.
- General implications for the EEC and the member states.

The only witnesses called, with the exception of the lawyers for Memorex and Amdahl who were given two hours out of the week between them, were from IBM. There was surprisingly little cross-examination.

IBM Called Major Venture In Europe

IBM is one of the major enterprises in Europe. The testimony of Jacques Maisonrouge, a director of IBM Europe and chairman of the IBM World Trade Corp., gives some indication of just how major an enterprise it is:

- IBM established its first European subsidiary in France in 1914. By 1948, IBM France had 1,048 employees; today it has more than 20,000.
- IBM has about 85,000 employees in the European Economic Community (EEC). All growth has been internal, with no mergers or acquisitions. Average annual employment growth in IBM in the EEC has been 7½% since 1957.
- IBM last year paid the EEC approximately \$500 million in corporate taxes, which places IBM among the 10 largest taxpayers in the community.
- IBM's annual purchases: Approximately \$1.4 billion through contracts to 40,000 suppliers.
- 1981 investment: Approximately \$1.6 billion.
- More than 90% of products installed in the EEC by IBM are of EEC manufacture. IBM has a positive EEC export balance.
- IBM has 12 manufacturing plants in the EEC, 850,000 square meters of manufacturing space, and is constructing a 13th plant in Italy.
- Average annual growth rate has been more than 13% a year since 1957.
- IBM conducts as much of its outside procurement activity as possible in those countries where it does not have manufacturing operations and purchases parts and services in every community country.
- IBM's research and development activities in the community are conducted in three laboratories, a component development group and two software development centers.
- On any business day, there are about 5,000 IBM customers and employees attending classes organized by IBM in the EEC, and IBM spends the equivalent of 9.5% of salary costs for education.
- Between 1974 and 1981, revenues of IBM's European operations grew from \$4.2 billion to \$9.3 billion.
- Including IBM Africa and Middle East, part of the IBM Europe Group, employees went up to more than 100,000 and outside purchases rose to be worth almost \$2.5 billion in 1981.
- In terms of gross income, IBM Europe is roughly 31% to 32% of the total corporation.

IBM witnesses were allowed to present their testimony without any serious attempt at rebuttal.

Much IBM effort during the week, including a substantial part of the testimony of Frank Cary, IBM's chairman, went toward trying to show that the commission has got the market issue wrong. And if it has got that wrong, then the question of dominance drops out.

What IBM tried to show was a market in which almost all other computer manufacturers were competing with IBM. IBM introduced in evidence a survey of more than 6,000 competitive sightings covering most of the countries of the EEC over a period of years, which purported to show that there was competition

across the board.

Cary discussed only one page of this during the hearings, a page dealing with Burroughs. Yet, that page does not show the loss by IBM of any really large mainframe account to competition. For at the heart of the commission's case lies the belief that if one is to look at the users of large IBM mainframes, one finds that the major users have had IBM mainframes through three or four generations, and that these mainframes are at the core of their (the users) paper-shuffling DP operations.

The point was not made verbally by the commission at the hearings, but by the lawyer for Memorex, Van Bael. He pointed out that if one were to look at the Fortune 1000 compa-

nies, the IBM mainframe share was still steadily growing.

The inference was that this was the situation in Europe. It was a point which IBM was never to challenge head on. The IBM testimony instead sought to show how IBM mainframes had been reduced in importance in the scheme of customer installations, showing how what were lone IBM installations many years ago are now crowded out with other companies' computers. Surprisingly, for the most part, IBM relied on U.S. evidence, not European.

The IBM attack on the issue of bundling main memory was at the start much strengthened by a joint experts report prepared by the IBM expert

(Continued on Page 132)

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Customer Service Division
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IBM Operations Under Investigation in Europe

(Continued from Page 131)

Richard Case, a vice-president, and Prof. Frank Sumner of the University of Manchester for the commission.

IBM pounced on the point that technically there was no longer a separation between main memory

and the CPU. How, therefore, could main memory be treated as a separate product? This was again destroyed by Van Bael, who pointed out that, in the case of the 370/155 and the 370/165, IBM had itself chosen to sell memory entirely separately to the

CPU. This was not then a technical issue but a marketing issue.

Little was to be said about software in relation to the weight of evidence on other issues. Much was to be said on the interface issue. This had been well rehearsed in the U.S. cases, and that rehearsal was to show through.

What IBM would like to do is to preserve the present position in which release of interface information is made to competitive manufacturers at time of first shipment.

Throughout the hearings, IBM had taken the position that IBM and IBM Europe are for working purposes one, and that differences in the timing of the release of information would have a competitive effect on the position of IBM in the U.S.

But IBM was also to argue that interface information was proprietary information and that it was so complex that there was no such thing as an interface as the commission was describing it.

Its witnesses also sought to resist the notion that the bringing of interfaces into what one can call the public domain would help competition. They insisted that it would inhibit the drive to technological innovation.

IBM was also to spend quite some time on the question of due process. Numerous references to the U.S. legal position were introduced followed by the notion that, under in-

ternational law, the U.S. legal position should be paramount.

The last argument by IBM took the tack that there was a communality of interest between Europe and the U.S. against Japan. IBM phrased it as if IBM were now to be regarded as a European company, and surely it was not the commission's intent that as a result of taking action against IBM, the commission was setting out to reward the Japanese.

Here is Cary on the implications of finding against IBM: "Of course, it is certainly going to bring glad tidings to the Japanese companies and to the others outside the European Community that would not be affected in the same way by the proposed regulations."

Towards the end of his testimony, Cary added: "Let me say that the Japanese companies are large; they are well managed; they have ready access to technology and to users. They have the direction and the support of the Japanese Government to make EDP a major export industry."

"I humbly submit that they do not need any gratuitous advantage from the EEC," he said.

The hearing closed after five days, in which IBM fielded as witnesses Tom Barr, who led for it in many of the U.S. cases, and Robert Marjolin, former EEC vice-president.

Malik is a freelance computer journalist based in London.

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Communications Report Out

TEMPLE HILLS, Md. — A revised report, *Analysis of the Government Marketplace for ADP, Telecommunications and Electronics Products and Services*, has been released by Organon, Inc. The 600-page report contains information on the federal marketplace, descriptions of 1,000 expenditures for telecommunications and electronics products and services by departments and major agencies.

The information is organized for ready review and is cross referenced in a detailed subject index that will be especially useful to working sales people, the company said. The analysis takes into account the current political environment and the likely budgetary and expenditure results.

The report costs \$328 from Organon, Inc., P.O. Box 31044, Temple Hills, Md. 20031.

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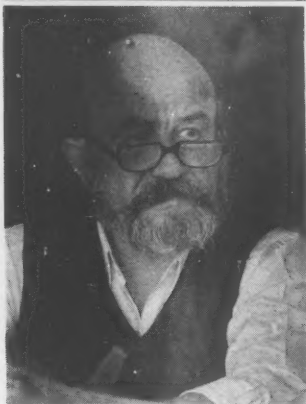
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SOFTMATICS
CORPORATION



Charles P. Lecht

New Companies

Micro Associates, Inc. will specialize in the development of engineering software for microcomputers. The firm can be reached at 2300 Highway, 365 LB 131, Nederland, Texas.

BTG, Inc. has been formed to provide support to all phases of system development, including requirements analyses, design, development, product assurance, maintenance and training. It is located at 7777 Leesburg Pike, Falls Church, Va. 22043.

Cosmos Systems, Inc. is a new subsidiary of CM Technologies, Inc. that will specialize in the manufacturing and sales of CM Technologies' microcomputer-based products. Cosmos Systems, Inc. is located at 525 University Ave., Palo Alto, Calif. 94301.

David L. Rico, Ltd., an organization that has exclusively sold the David Black Cobol generator, has added a subsidiary, **Computer Solutions**, to provide complementary software and hardware. More information is available from David L. Rico, Suite 23, 1780 Maple St., Northfield, Ill. 60093.

Decision Support Systems is a new company specializing in in-house consulting. It is located at 5948 W. 78th St., Los Angeles, Calif.

August Automation is a new firm providing software development services for mini and microcomputers in real time, military, communications, systems and business applications. It is located at 42 West St., Westboro, Mass. 01581.

Eiden Consulting Services is a new firm providing assistance in computer system planning, acquisition, software development and system management. The firm is headquartered at Suite 314, 2015 Ivy Road, Charlottesville, Va. 22903.

Intertec Development Corp. is a new firm specializing in the strategic planning of electronic information systems. It is located at Suite 531, 2680 Bayshore Frontage Road, Mountain View, Calif. 94043.

To Explore High-Tech Horizons

ACT Founder Launches Dream Venture

By Lois Paul
CW Staff

NEW YORK — After 20 years as founder, president and chairman of the board of Advanced Computer Techniques Corp. (ACT), Charles P. Lecht is striking out in new directions.

Last month, the futurist who authored *The Waves of Change* resigned from ACT and presently is in the process of establishing a new company called Lecht Computer Sciences.

Interviewed recently in his glass-enclosed apartment above the United National Plaza, which will serve as his new firm's headquarters, Lecht said, "I finally got my dream in a way," which is to write and do re-

search and lecture.

Lecht spoke in about 35 different cities last year and has been following a similarly hectic lecture tour this year. It was after a recent trip to Johannesburg, South Africa, that he took a hard look at ACT and made his decision to move on.

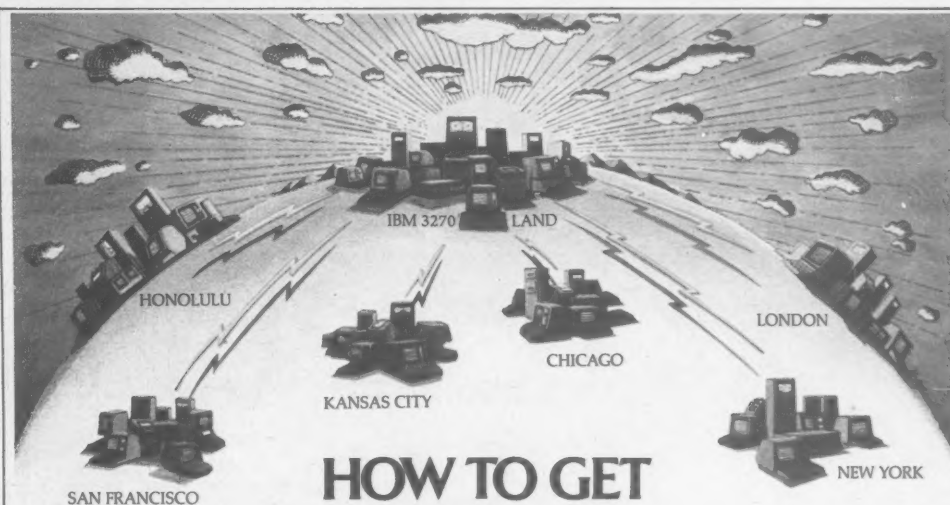
It was nearly 20 years to the day since Lecht formed ACT. "Everybody always talks about [moving on], but very few people act to move," Lecht said. "I just decided that 20 years was enough of one job."

The objective of the new company, as Lecht explained it, is "to write, explore and do actual experimentation in the forefront of computer and communications systems." He will

be working in conjunction with a neurosurgeon and others who will join the firm shortly.

Lecht's plans include research into bionic devices and the use of large-scale integration for disabled people. Lecht described Lecht Computer Sciences' work as being similar to what a "Bell Labs in a microcosm would do in ascertaining the validity of new concepts," such as protein computer devices. He also wants to look into IBM and other hardware manufacturers' plans in order to forecast the direction technology is taking.

As always, he will be "working in the avant-garde area. If it is being done routinely, I don't want to do it anymore," he said.



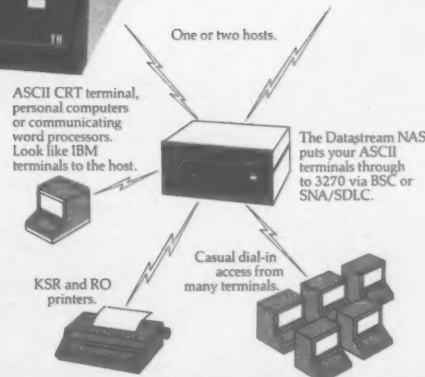
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DATASTREAM

Burroughs Gains New Chief, Revamps Strategy

(Continued from Page 123)
and manufacturing.

Burroughs' decision to name Stern as its latest president came just one day before the board of directors voted to approve the creation of an Industry Systems group, which seeks to strengthen the company's position in selected vertical submarkets.

Under the direction of Senior Vice-President William Conlin, the newly formed organization will focus exclusively on the half dozen or so target industries that Burroughs has identified as key to its long-term marketing strategy.

Chief among those high-priority market sectors are businesses like banking, manufacturing, wholesale/distribution, health care and education, Blumenthal said here during a May 27 press conference.

The Industry Systems group will also be responsible for all of Burroughs' activities in the office automation and small business computer fields.

'Fundamental' Departure

The decision to place industry-specific products on an equal corporate footing with their general-purpose counterparts signals a "fundamental" departure from Burroughs' traditional methods of marketing its systems, Blumenthal said.

Until recently, the firm was content merely to classify its wares as either large or small and organize its marketing effort accordingly. But today, Burroughs is taking a radically different approach, stressing corporate organization along specific "lines of business," according to Blumenthal.

Under the lines-of-business concept, the company first identifies selected vertical market sectors that show particularly large growth potential and then organizes its planning, engineering and manufacturing resources to take advantage of that expansion.

Specialized Focus

The result is that Burroughs' marketing focus is becoming increasingly specialized. "Specialization is the way to go," Blumenthal said, and probably provides the surest means for the firm to "maximize" its business opportunities.

Although Burroughs is by no means the only systems vendor to try to explore the financial benefits of increased specialization, "I don't think many other firms have gone as far in their lines-of-business marketing emphasis as we have," Blumenthal said.

mental said.

In the wake of its latest corporate reorganization, Burroughs now divides its overall product-development effort into three main entities. One of those entities is the infant Industry Systems group.

The other two include the System Products organization, which focuses on general-purpose computing equipment, and the Corpo-

rate Operations arm, which covers assorted staff activities. All three business entities come under Stern's overall management control.

Both the System Products and Corporate Operations groups came into being just last year and marked the start of an ongoing Burroughs reorganization that culminated in the formation of Industry Systems, the company said.

Burroughs Offers Dividend

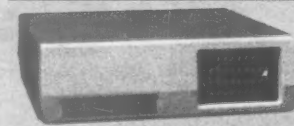
SAN FRANCISCO — At its board of directors' meeting in the Bay Area recently, Burroughs Corp. declared a 65-cent dividend on its common stock, payable Aug. 7 to shareholders of record on July 7. This the firm's 370th dividend.

In addition, the board authorized the purchase of up to one million shares of common stock on the open market until December 1983.

The stock purchases will be used for the company's stock-option program.

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- Input ports can be asynchronous or byte synchronous (IBM 2780, 3780 or 3270 equivalent)
- Async or bsync inputs statistically multiplexed on data link
- 16 selectable input data speed/code level combinations up to 9.6 Kbps
- Data link speed up to 16 Kbps
- Jumper blocks easily establish DTE or DCE interface
- UL listed
- Many more standard features and options available

CM9100H and CM9100M Stat Mux/Modems

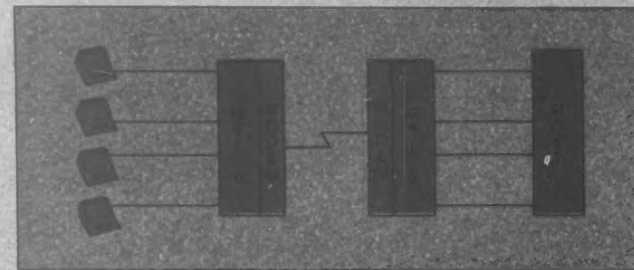


- Offers all the features of CM9100 Stat Mux plus contains an integral modem
- High performance modem features:
 - CM9100H—9.6 Kbps, V.29 compatible
 - Automatic Speed Fallback to 7.2 and 4.8 Kbps
 - CM9100M—4.8 Kbps, V.27 compatible
 - Automatic Speed Fallback to 2.4 Kbps
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- Full modem status indicators
- All digital automatic adaptive equalization

SM9200 Switching Multiplexer



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 - Port Contention—Users contend for port connection (permits asymmetrical network configurations)
 - Rotary Connection Group—User contends for a selected group of ports
 - Supervisory Port—Privileged user ascertains system status and/or disconnects existing switched circuits
 - Data PBX—Acts as a matrix switch to interconnect up to 64 ports on user command
 - UL Listed

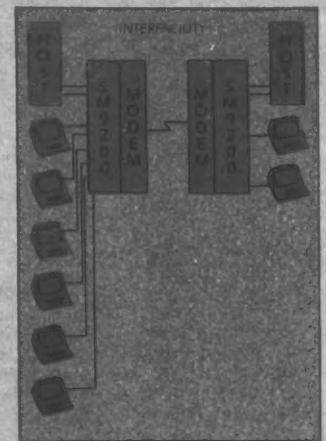


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Solve Your Data Switching Problems

CTC Agrees To Buy STSC

ATLANTA — Continental Telephone Co. (CTC) and STSC, Inc. have reached an agreement in principle whereby CTC will acquire STSC for cash. CTC will buy STSC's common shares for \$11 each, bringing the value of the acquisition to about \$24 million.

Located in Rockville, Md., STSC is a major supplier of computer services based on the APL programming language. Its revenues last year

were \$28 million.

Commenting on the acquisition, Edward J. Nicoletti — CTC's vice-president of information services — said STSC would serve as one of the cornerstones for major expansion by the communications firm into computer services.

Other Moves

Anacomp, Inc. has reached an agreement in principle to

acquire the assets and to assume the disclosed liabilities of Astradyne Computer Industries, Inc. in exchange for shares of Anacomp common stock valued at a maximum of \$3.6 million.

Mohawk Data Sciences Corp. has entered into an agreement to acquire DEK Identification Systems, Inc. (formerly DEK Photo Systems, Inc.), a producer of col-

or photo identification cards, subject to the approval of the shareholders of DEK.

Pericomp Corp. has completed an agreement to acquire the assets of Data Information Systems (DIS) for an undisclosed consideration. DIS will operate as a division of Pericomp and will relocate from its Billerica, Mass., facility to Pericomp's corporate headquar-

ters in Natick, Mass.

C.W. Systems, Inc. of Richmond, Va., has completed acquisition of Superior Software, Inc. of Jamestown, N.Y.

Nickels & Dimes

Votan, Inc. has received the first major installment of \$3.5 million in capital financing raised through the sale of a minority equity interest to Honeywell, Inc. The funds will be used for marketing the company's new line of proprietary voice recognition products.

\$\$\$

Point 4 Data Corp. has completed a second round of equity financing with its original investors. Participating in the investment are Oak Investment Partners, Westport, Conn.; J.H. Whitney & Co., New York; Morgenthaler Venture Partners, Cleveland; and Hambrecht & Quist, San Francisco.

\$\$\$

Microcom, Inc. has completed arrangements with five venture capital firms for several million dollars in second-round financing. Investors include Menlo Ventures, Menlo Park, Calif.; Welsh, Carson, Anderson & Stowe, New York; Chatam Venture Corp., Boston; East Tech Associates, Boston; and Coastal Nominees of the U.K.

\$\$\$

Priam Corp. has completed \$7.1 million of additional funding and \$4 million of additional equipment lease financing through the sale of preferred stock and convertible subordinated debentures. Allstate Insurance Co. of Chicago was the principal participant. Others included J.F. Shea Co., Corning Advisors, L.F. Rothschild Unterberg Tobin and Investech.

give you error-free transmission, switching multiplexers which give you full connection flexibility, a new error controller which eliminates transmission link induced data errors for asynchronous devices, and a lightwave multiplexer which provides high bit rate communications in any environment. We further offer a full range of standard features, options, and accessories to operate with your data-processing equipment whether it be IBM, DEC, Data General, Hewlett-Packard,

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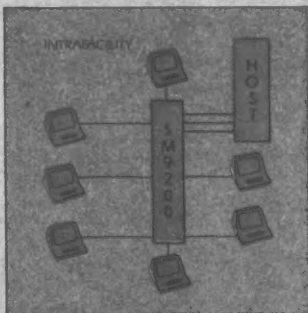


Leading the Way in Data Communications Technology

SM9200H and SM9200M Switch Mux/Modems

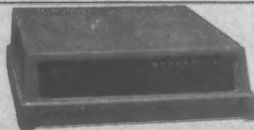


- Offers all the features of SM9200 Switch Mux plus contains an integral modem
- High performance modem features:
 - SM9200H—9.6 Kbps, V.29 compatible
 - Automatic Speed Fallback to 7.2 and 4.8 Kbps
 - SM9200M—4.8 Kbps, V.27 compatible
 - Automatic Speed Fallback to 2.4 Kbps
 - Analog and digital local and remote modem loopback
 - Full modem status indicators
 - All digital automatic adaptive equalization



Solve Your Internal Data Switching Problems

EC9400 Error Controller

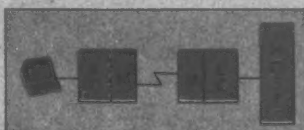


- Provides error-free transmission for any asynchronous device to a host computer
- Allows 9.6 Kbps asynchronous transmission over standard phone lines with synchronous modems
- Connects directly between phone line modem and attached device
- 16 selectable input speed/code levels from 50 to 9600 bps
- Dedicated or dial-up data link operation
- Extensive buffering up to 32 Kbytes

EC9400H and EC9400M Error Controller/Modems



- Offers all features of EC9400 Error Controller plus modem for the price of a modem alone
- High performance modem features:
 - EC9400H—9.6 Kbps, V.29 compatible
 - Automatic Speed Fallback to 7.2 and 4.8 Kbps
 - EC9400M—4.8 Kbps, V.27 compatible
 - Automatic Speed Fallback to 2.4 Kbps
 - Analog and digital local and remote modem loopback
 - All digital automatic adaptive equalization

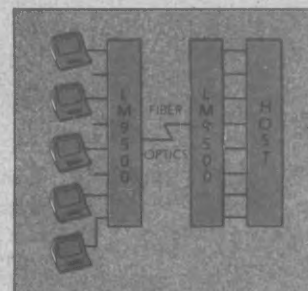


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Study Finds Data Communications Budgets Up

NEW YORK — Expenditures for data communications have increased 22% annually among data processing users during the past seven years, according to a new market study by Frost and Sullivan, Inc. The growth rate is projected to continue through the 1980s, with 1981 user budgets at \$6.4 billion expected to reach approximately \$12.5 billion by 1985.

The report, entitled *Data Communications and Services in the U.S.*, also predicted the market will be driven by the increased use of distributed data processing techniques and remote data terminal equipment. The increased number of services, including 11 new common carriers, three packet-switched public data networks (value-added networks) and a variety of message services, will also

have an impact on this growth.

Hardware expenditures associated with such services will also be on the rise as a threefold increase in multiplexer installations takes place over the next five years, the study said.

Another Finding

Another survey finding was that dedicated private lines together with the dial-

up network carry more than 80% of all data traffic, private networks carry another 14% and value-added networks carry about 3%.

The survey also found terminal data speed continuously on the rise, with one-third of the respondents reporting line rate usage at 1,200 to 4,800 bit/sec. Also, the critical priority among users when selecting a data communications service was

reliability and availability, followed only then by cost and response time, the survey noted.

A copy of the report is available for \$1,200 from Frost and Sullivan, 106 Fulton St., New York, N.Y. 10038.

Report Says CRT Sales To Rebound

SAN JOSE, Calif. — Alphnumeric CRT terminal sales and shipments will rebound after their weak performance in 1980, according to a report issued by Creative Strategies International, Inc. In 1985, more than two million CRTs will be shipped.

According to the report, Alphnumeric CRT Terminals, the rapid proliferation of computer systems and the growth of the electronic/automated office concept and distributed data processing will spur continuing growth in CRT use. The report deals strictly with alphnumeric (dumb, smart and intelligent) terminals, excluding graphics terminals, point-of-sale devices, personal computers and small and very small business computers.

The report also says that vendors are competing fiercely in the CRT terminal industry with 205 vendors selling more than 400 models. However, the number of competitors entering the market has slowed in the last few years. A shakeout in the dumb and smart terminal sectors will be counterbalanced by a steady influx of new vendors, the report forecast.

Market shares remain small with only IBM holding more than 50% of any one particular market segment. Although IBM dominates the smart terminal segment, independent vendors are slowly eroding its market share in that area, the report says.

The report is available for \$1,200 from Creative Strategies International, Suite 275, 4340 Stevens Creek Blvd., San Jose, Calif. 95129.

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Firms Desperate for Engineers

AEA Lobbying to Amend Foreign Student Bill

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Legislation that electronics and computer firms fear would greatly add to their manpower shortages by restricting the availability of foreign engineers is now the subject of heavy lobbying by industry representatives, some of whom are now optimistic the bill will be satisfactorily amended.

The controversial measure is part of an immigration reform bill moving quickly through Congress. One provision of the legislation would force foreign students to leave the U.S. once they graduate, for at least two years.

Electronics companies, desperate for engineering graduates, would not be able to hire the numbers of foreign students they now count on. Defense contractors must employ U.S. citizens for security reasons, leaving other companies dependent on foreign-born employees. According to one industry calculation, some firms' research departments are over 50% foreign workers.

The university community is also alarmed because the bill, if passed, would deprive schools of thousands of students they count on to fill out their graduate programs. The majority of American students are attracted into industry jobs by high salaries and do not enter graduate programs.

If the students are forced to leave the country after their bachelor degrees, according to the universities' thinking, the students are not likely to wait two years to return and finish their education. This would also remove a prime source of university engineering faculty.

More likely, those students will attend graduate schools in other countries. Further, many foreign students will not come to the U.S. for undergraduate studies if they believe they will not be allowed to complete their education here. According to one estimate, American colleges receive as much as \$2.5 billion a year in tuition from foreign students.

Opposition to the legislation has been slow to develop, but the last

few weeks have seen increasing pressure brought to bear on Congress to delete that portion of the bill or to amend it to exempt students pursuing an education in areas of manpower and faculty shortages, such as electronics and computer sciences engineering.

Top of the List

When 140 members of the American Electronics Association (AEA) came into town late last month to buttonhole congressmen and senators and bend the ears of key committee aides on subjects dear to the industry's heart, the immigration bill was at the top of the lobbying list.

Several of the AEA members, almost all 140 of whom are chief executive officers or high-level executives of their companies, told *Computerworld* they found many on Capitol Hill receptive to their complaints about the immigration legislation.

T. Z. Chu, former chairman of the AEA board of directors, said he found "most members of Congress didn't even know about the bill." He said many members of Congress, particularly those who represent high technology districts, were sympathetic to association arguments.

Chu, president of Finnigan Corp., a San Jose, Calif., manufacturer of analog devices, said he is optimistic the

bill can be amended, but he noted it is already fairly advanced in the legislative process and there is little time left to remove the provision.

Similarly, Pat Hill Hubbard, AEA vice-president for engineering education, said the association members found on Capitol Hill "a lack of awareness of the impact [of the bill on the manpower shortage] and a growing concern that indeed there is legitimate cause for worry."

Saying "the bill is in a great deal of trouble," she suggested "people are beginning to realize there was a rush to judgment on this... There is a groundswell [of opposition] and the Hill is listening."



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MSC Wins Suit On Trade Secrets

SUNNYVALE, Calif. — Microcomputer Systems Corp. (MSC) has been awarded \$1.4 million in damages, excluding a future award of interest and court costs, in its suit against Data Technology Corp. (DTC).

Judge Barton Phelps of the California Superior Court ruled in favor of MSC in the case of MSC's allegation that DTC had appropriated trade secrets and used MSC's confidential information to the detriment of the plaintiff.

The court ruled that two former MSC employees used confidential information gained during their employment to construct a controller similar to the MSC-1000 series — the DTC-IKA family sold by Shugart Associates, Inc. as the SA-1400 series.

MSC is headquartered at 432 Lakeside Drive, Sunnyvale, Calif. 94086.

Calculon Corp.'s Management Systems Group has been awarded a contract with the Department of Energy's (DOE) Office of Management Information Systems to assist with the analysis, development and implementation of management information processes and systems for DOE. The one-year contract has three one-year options and a total value of approximately \$7 million.

Computer Automation, Inc. has received a contract from Boehringer Mannheim Diagnostics, Inc. for its LSI-2/-40 minicomputers. The systems will operate as the primary control devices in the company's 8700 series automated blood chemistry analyzers used in medical laboratories and hospitals. The contract is valued at \$1.45 million.

Informatics, Inc. has agreed to license its terminal applications processing system (Taps), an implementation software system for transaction processing applications, to Cambex Corp. Under the terms of the three-year agreement, Informatics will receive a royalty for each copy of Taps software licensed with a Cambex processor.

Sorbus Service Division, a subsidiary of Management Assistance, Inc. has signed an agreement with Visual Technology, Inc. to provide on-site third-party maintenance services to owners of Visual Technology's video display terminals.

M/A-COM DCC, Inc. has been awarded a \$500,000 subcontract by Ford Aerospace and Communications Corp. to provide CP9000 packet switching equipment for the Missile Warning Bypass program directed by the Electronic Systems Division of the Air Force Systems Command.

Centennial Computer Corp. has signed a multiyear OEM agreement with IBM Corp. for the purchase of IBM 3851 mass storage facilities. The facilities will be incorporated into Centennial's MS/1 mass storage system along with a Digital Equipment Corp. computer and local staging facility disks.

The Naval Equipment Training Center (Ntec), Orlando, Fla., has issued a blanket purchasing agreement to U.S. Computer Corp. of Orlando for unlimited technical and computer services. Ntec has over 80 divisions within the Orlando facility, which may utilize services through the agreement.

Molecular Computer has signed a \$5 million, 18-month contract to supply its Supermicro 8 and Supermicro 32 microcomputers to national computer distributor David Jamison Carlyle, Inc.

M/A-COM, Inc. has received two contracts from the U.S. Department of Health and Human Services for computer equipment to provide batched telecommunications capabilities between remote installations and the Social Security and Health Care Finance Administrations headquartered in Maryland. The contracts, which extend over an eight-year period, have a total value of \$12 million.

Contracts & Pacts

Graphic Concepts, Inc. has been awarded a \$750,000 contract by the Air Force Logistics Command and Wright-Patterson Air Force Base for a prototype office information system.

Martin Marietta Corp.'s Data Systems Division has been awarded a \$16 million contract for a computerized instructional support system for the U.S. Military Academy at West Point, N.Y.

Point 4 Data Corp. has signed a \$4 million OEM contract with North American Computers (NAC) of Lubbock, Texas, making NAC a Point 4 master dealer. NAC will move approximately 400 computer systems through its dealer network.

Micropolis Corp. has received a \$2.4 million order from Plessey Peripheral Systems, a division of Plessey Co., Ltd., for 8-in. Winchester disk drives. Delivery will be over a two-year period.

Eagle Computer, Inc. has selected Rotating Memory Systems, Inc. as its primary supplier of hard disk drives for its Eagle IV and Eagle V computers.

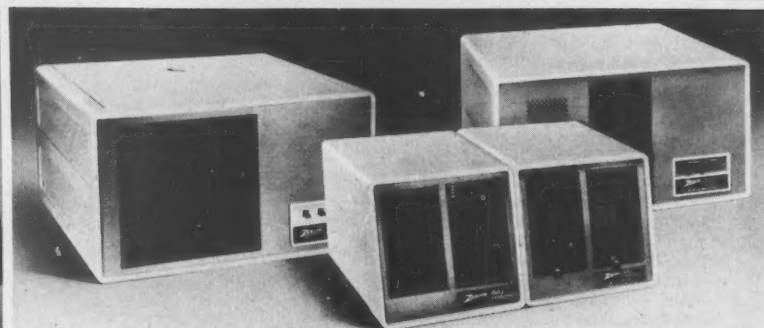
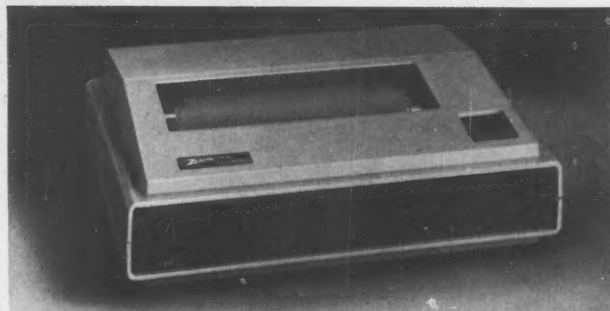
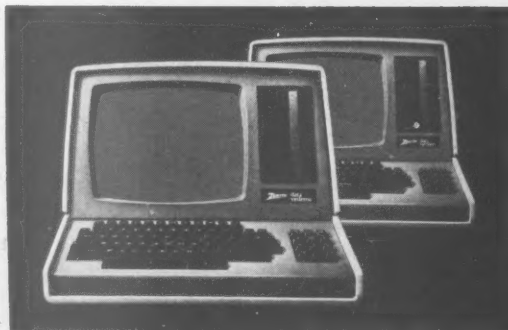
Applied Data Research, Inc. (ADR) has signed an agreement with Digital Equipment Corp. under which ADR will design and develop microcomputer software products for Digital's new professional personal computer. The ADR products will

be available for delivery in the fourth quarter of 1982.

Altos Computer Systems, Inc.'s contract with Moore Business Systems has been extended by \$12 million over the next three years, bringing the total value of the contract to \$22 million. More than 1000 Altos microcomputers will be shipped annually to Moore to be used as the processor in turnkey systems marketed by Moore to dentists, service stations and other small business operations.

Battelle Memorial Institute's Columbus Laboratories and Digital Equipment Corp.'s Publishing and Broadcast Industries Group will jointly market Battelle's full-text library system, Basis, on Digital's VAX family of minicomputers. The full-text indexing and retrieval data base management system has been

What if you could Zenith quality for



enhanced for use as an automated newspaper library and will be marketed to media industries throughout the world.

Vector General, Inc. has signed an OEM agreement with Perkin-Elmer Corp.'s Data Systems Group to supply VG 8250 controller display stations for the new PE distributed Cam-dam workstations.

Compucorp has received an order from IMS International for the delivery of approximately \$15 million of additional Pharmex retail information systems by the end of 1983.

Datapoint Corp. has granted Standard Microsystems Corp. a nonexclusive license to market Datapoint's Rim chip and the associated Arcnet transceiver chip. The two-chip set provides the electronics necessary

for Arcnet interfacing and will be sold as a part of Standard Microsystems' standard product line.

Amdahl Federal Service Corp. has been awarded a contract by the Air Force Acquisition Center for an Amdahl 470/V7 processor unit, support equipment and services for the Air Force Accounting and Finance Center, Lowry AFB, Colorado. The contract is valued at \$1.4 million.

Bridge Communications, Inc. has signed an agreement with Sytek, Inc. to develop a "gateway" product to link the incompatible technologies of Xerox network system Ethernet baseload local-area networks and Sytek's Localnet broadband networks.

The product will be marketed simultaneously by Sytek and Bridge.

Trilog, Inc. will provide Calma Co. with color and black-and-white printer/plotters for use as hard-copy peripherals with Calma's computer-aided design and manufacturing systems.

The Trilog units are offered as options with these systems for design applications ranging from micro-electronic circuitry design to large-structure architectural and engineering design.

Memorex Corp. has signed license agreements with DMA Systems Corp. to manufacture and market DMA Systems micromagnum 5/5, a

5½-in. fixed/removable Winchester disk drive.

Computer Sciences Corp. has received a three-year, \$1 million contract from the Navy to support electronic warfare testing at the Naval Weapons Center, China Lake, Calif.

TRW, Inc. has signed five-year, exclusive, authorized customer service agreements with Cromemco, Inc. and Televideo Systems, Inc.

TRW began providing on-site service on March 1 for Cromemco's line of microcomputer products at 30 locations nationwide. Service for Televideo's small business computer products will begin on June 1 and will include installation, warranty and on-site maintenance.

Western Union has signed an agreement to service Micro-Term Inc.'s terminals through their 450 service locations in the continental U.S.

Denelcor, Inc. has delivered the first of four heterogeneous element processor computers to the U.S. Army Ballistics Research Laboratory, in Aberdeen, Md. Delivery of the remaining three processors is scheduled for September. The contract is valued at \$7.7 million.

Decision Data Corp.'s Customer Service Division has selected Pine-tree Systems, Inc. to supply their field engineers with portable data entry terminals. The value of the contract was not disclosed.

Cortex Corp. has signed a marketing agreement with Digital Equipment Corp. to provide eight software packages designed for DEC's new professional series computers.

Tridata Systems, Inc. has signed an OEM agreement with Bytronix Corp. to market the firm's processors, controllers and multiplexers along with I/O products from Quentin Research, all operable under Basic operating system software developed by Dynamic Concepts, Inc.

Ross Systems, Inc. has signed an agreement with Digital Equipment Corp. to supply a version of its Maps software package for use on Digital's new professional 350 personal computer.

General Electric Co.'s Service Engineering Division has signed an agreement to provide nationwide maintenance service to Spectra Logic Corp.'s emulating disk and tape controllers used with Digital Equipment Corp. and Data General Corp. minicomputer systems.

TSD Display Products, Inc. has received an order valued at nearly \$500,000 from A.R. Shaw of Savage, Minn., for its touch-screen terminal.

Sony Corp. has concluded a multi-year OEM supply contract with Hewlett-Packard Co. for Sony's 3½-in. micro floppy disk system. HP will use the system as a future standard for some of its computer-related products. The contract is valued in excess of \$30 million.

Contracts & Pacts

offer your customers every application?

You could if you specified Zenith.

Until now, if you wanted to meet the needs of a variety of customers, you had to rely on a variety of manufacturers.

But now you can get everything you need from one reliable source. Now you can do away with "mixing and matching" hardware, software and service arrangements.

With Zenith's expanded product line, you can now offer your customers a full line of high-quality, affordably-priced systems.

Zenith has entry level systems with 160K of storage. Expanded systems with 480K. Multi-function systems with 2MB. And high-capacity systems with 11MB!

What about software? We've got that, too! Our catalog now includes the finest in business applications—like SuperCalc, CONDOR's Series 20 Data Base Management System, the latest versions of Peachtree's business programs and multiple levels of word processing.

We have BASIC-80 Interpreter, BASIC-80 Compiler, C-BASIC Compiler/Interpreter, FORTRAN-80, COBOL-80, CP/M and HDOS operating systems and languages. Plus a variety of useful utility packages.

Many of our software offerings include special Zenith enhancements for easier start-up. And *all* of our software has been thoroughly tested to meet Zenith standards of quality and dependability.

Once you specify Zenith, your service problems are over, too. We have on-site warranty service available anywhere in the country. Should you need help, or want to discuss modifications, just call our toll-free technical service hotline.

For more information about any of our products, contact your nearest Zenith Data Systems distributor. Or call (800) 323-5924. In Illinois, call (312) 391-8860.



data
systems

The quality goes in before the name goes on.

SEE US AT THE NCC BOOTH 5055

**ANNOUNCING
NETWORK
SOFTWARE
FOR THE ONLY
CERTAINTY
IN AMERICAN
BUSINESS:
UNCERTAINTY.**



**COMMUNICATIONS SOFTWARE
SO FLEXIBLE, IT'LL HELP
YOU EASILY KEEP PACE WITH
CHANGE, INSTEAD OF
BEING OVERWHELMED BY IT.**

In the absence of any quick and infallible means of foretelling the future, Data General has designed the next best thing:

The only networking software that accepts the inevitability of change—and is designed to be flexible and comprehensive enough to absorb change as it happens.

**A TRANSPARENT
SYSTEM THAT'S ACTUALLY
TRANSPARENT.**

Data General believes that when it's not necessary to change your applications software, it's necessary not to change it. And our networking software reflects this.

Those periodic network changes that all companies go through (from new computers to new communications links) will require no corresponding overhaul of your applications programs. Your accounting department, for example, can relocate to

another floor, city or even continent without requiring any change in the way your accounting people access or use information. Sparing you any hurried, and costly applications reprogramming.

**SNA AND X.25 NETWORKING
THAT WORK IN CONCERT, NOT
AT CROSS-PURPOSES.**

While there are dozens of companies touting networking software, only a few promise SNA compatibility.

Of these, only one, Data General, is delivering SNA and X.25 networking running simultaneously on the same machine. And the advantages of this in terms of communications flexibility are self-evident.

**LOCAL AND REMOTE
NETWORKING
THAT ACTUALLY EXISTS.**

You are currently being urged into office automation on practically every other page of publications such as this.

What's ironic is that many of those doing the urging do not offer the integrated local and remote networking without

which true office automation is impossible.

Data General does.

Nor do we require you to make any hard choices to support your network.

Whether it's local, global, batch, interactive, public, private, bisync, SDLC, peer, hierarchical, commercial, scientific, mini to mini, or mini to mainframe, Data General has it. And it all runs on our ECLIPSE® family of 16- and 32-bit computers.

All of which is vital.

After all, if you're being asked to build a network, you're in effect being asked to do the impossible—namely, see into the future. And nobody else makes the impossible as accessible as Data General.

For more information write to Data General, Dept. B1, 4400 Computer Drive, Westboro, MA 01580.

Data General
WE ENGINEERED THE
ANXIETY OUT OF COMPUTERS.

Executive Corner

- Michael H. Anderson has been appointed president and Robert J. Nicewicz has been appointed senior vice-president of Nixdorf Computer Corp.

- Harold J. Detlefs has been elected vice-president of marketing at Comsat General Telesystems, Inc.

- Jeffrey Wise has been appointed vice-president, engineering, for New Media Graphics Corp.

- Thomas B. Towers has joined Visicorp as vice-president of marketing.

- Andy Reichert has been

named vice-president of engineering for Vector Graphic, Inc.

- Gary L. Schoettmer has been promoted to vice-president, product development, for Plantronics/Santa Cruz.

- Joel Levine has been named vice-president of product marketing for International Memories, Inc.

- John C. Scott has been named to the new position of vice-president of worldwide

marketing, Daniel J. Ellis has been named vice-president of western area operations and Gary M. Holtwick has been named division vice-president of product marketing at Storage Technology Corp. James B. Preston, vice-president of eastern area operations for domestic sales, has been elected a corporate officer of the company.

- John D. Familetti has been elected corporate vice-

president of Penril Corp. He will continue as general manager of Penril's data communications center.

- Andrew A. Procassini has been named vice-president of marketing for Cromemco, Inc.

- Michael A. Theiss has joined First Chicago Data Corp. as vice-president and marketing manager.

- Barry P. Harmer has been elected vice-president of

DAC Computer Services, Inc., a subsidiary of Unifinancial Corp.

- Robert P. Berry has been named vice-president for U.S. equipment sales and service at Memorex Corp.

- Stephen F. Mendel has joined Molecular Design Ltd. as vice-president and general counsel.

- Chappell Cory III has been named to the newly created position of vice-president of operations and Robert D. Groves has been named vice-president, international, for Xylogics, Inc.

- Fred Tschopp has been promoted to vice-president and general manager of System Development Corp.'s integrated systems division.

- Ronald Conway has been promoted to vice-president for North American sales and marketing, David Liggett to vice-president of operations and Will Stinson to vice-president for advanced engineering at Altos Computer Systems, Inc.

- J. Marne Gleason has been appointed vice-president and general counsel of Burroughs Corp.

- M. John Drach has been appointed assistant vice-president, general service sales, at American Satellite.

- Dallas Talley has been appointed president and chief executive officer and Joe R. Brooks has been appointed senior vice-president, finance and administration, of Mohawk Data Sciences Co.'s MDS Qantel. Brooks will continue to serve as vice-president of MDS. Harry L. Hoberman has been appointed senior vice-president, finance and administration, of MDS Systems Division.

- Mario E. Lacada has been elected chairman, president and chief executive officer of On-Line Microcenters, Inc.

- Michael L. Carrico has been elected president and chief executive officer of Compass Computer Services, a subsidiary of Hilton Hotels Corp. and Transamerica Corp.

- Fred A. Snow has been appointed president and chief operating officer at Vector Graphics, Inc.

- Douglas J. Russo has been appointed vice-president of marketing for Ecco Computer, Inc., a subsidiary of Ecco, Inc.

- Roger A. Smullen has been named acting president and chief executive officer of Applied Micro Circuits Corp., following the resignation of Howard S. Bobb.

- Robert B. Phinzy, president of Genisco Technology Corp., has been elected chairman of the board and chief executive officer of the firm's subsidiary, Genisco Computers Corp. Genisco Computers President Robert J. Gray has been elected to the subsidiary's board of directors.

(Continued on Page 144)

How do you create a microcomputer to match the power of the UNIX operating system?

Imagine. You are perfecting a revolutionary operating system. In about two years, it will be the system of choice for 16-bit microcomputers.

But the breakthrough features of this operating system are going to make stringent demands on the computer.

Your operating system will be named UNIX.

The microcomputer, developed specifically for your operating system more than two years before commercial UNIX distribution, is named ONYX.

ONYX will live up to every demand and expectation.

To achieve the ultimate flexibility, simplicity, efficiency and productivity, the UNIX operating system will incorporate a file system of highly uniform sets and subsets of directories, arranged in a tree-like hierarchical structure.

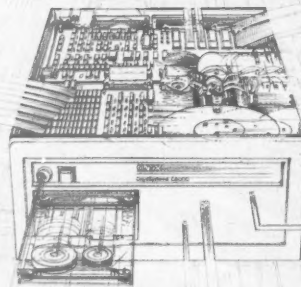
And flexible directory and file protection modes, allowing all combinations of "read," "write," and "execute" access, independently for each file or directory, or for a group of users.

But these advantages will require intensive disk access, and superior memory management. In simple language, disk access must be as fast as possible, and the disk must have an unusual capacity to maintain complex file systems on-line at all times.

Floppy disks with their low capacities and high access times won't do.

Winchester disk drives that utilize slow-moving stepper motor head positioning devices won't do.

ONYX's IMI Winchester disk storage system, with its servo-driven voice coil



head positioning, is more than twice as fast!

So, obviously the ONYX C8002 will do.

And, as developed, the ONYX C8002 features expandable memory up to 1 Mbyte, and disk storage up to 160 Mbytes on-line. Its cartridge tape backup offers cyclical redundancy checking on every backup. Both the Winchester disk storage system and the cartridge tape backup are internal.

Now it's 1982. The UNIX system's pre-eminence among 16-bit operating systems is established. And ONYX is the only company that has significant production experience with UNIX systems.



ONYX has installed over 1500 UNIX systems.

In the UNIX operating environment, the disk becomes an extension of main memory. "Swapping" programs between the disk and main memory increases the number of operations that can run concurrently. ONYX's memory management system utilizes "scatter" instead of "contiguous" allocation, and the more efficient swapping minimizes demand on the disk channel. That's why ONYX assures a highly efficient environment for the UNIX operating system.

Today there are a lot of systems being developed to operate with the UNIX (and "UNIX look-alike") operating systems. But there are many reasons why you should consider the names UNIX and ONYX as inseparable.

UNIX System III available now for immediate delivery.

Phone this special number: (408) 946-6330 Ext. 238. Ask about these System III enhancements, including:

- Multi-key index sequential files under RM COBOL;
- "Term Cap" capability that supports a wide variety of terminal interfaces;
- Enhanced printer handling capability;
- SCCS to maintain edit histories in text management applications.

*UNIX is a trademark of Bell Laboratories.

Make the Connection

ONYX UNIX

OPERATING SYSTEM

Onyx Systems Inc., 25 East Trimble Road, San Jose, CA 95131

On-Line Computer Library Center (OCLC) and Five Colleges, Inc. have entered into a collaborative agreement whereby OCLC will develop, install and evaluate an automated local library system that will link the library resources of Five Colleges, an educational consortium of Amherst, Hampshire, Mount Holyoke and Smith colleges and the University of Massachusetts at Amherst. Their libraries have combined holdings totaling more than 1,495,000 volumes and microforms.

Computer Environments, Inc., a subsidiary of Ernest Jarvis and Co., Newark, N.J., recently completed the design and installation of a \$250,000 support and back-up system for CPC International, one of the 10 largest food companies in the U.S. The system includes a 75 kVA Cyberex uninterruptible power supply, which provides continuous, transient-free frequency stabilized power under essentially all abnormal utility operating conditions, including total loss of power for up to 15 minutes.

Northern Telecom, Inc. has been awarded a contract for its SL-100 digital business communications system by the University of Texas. The system, which will serve 49,000 students and faculty at the main campus at Austin, will be equipped with nearly 1,000 trunks and approximately 8,500 telephone lines. The contract is valued at \$4 million.

Kebert Corp. has installed its first Keyword at General Business Technology. Keyword is a menu-driven package that offers full function processing and the ability to access existing data files within the IBM System/34.

Automatic Data Processing, Inc.'s network services division will provide the U.S. Synthetic Fuels Corp. with a variety of initial computing services including systems design and development, teleprocessing and remote computing services for administrative, financial, engineering, project management and legal applications. U.S. Fuels was formed in June 1980 to stimulate the development of a private-sector synthetic fuels industry through loan guarantees, price guarantees, direct loans and other financial support arrangements.

New Hampshire Savings Bank has become the first subscriber to Cadre's disaster recovery program, which protects investors and the bank from catastrophic events that would render the Burroughs Medium System Computer Center inoperable. Cadre was formed by the People's Bank of Bridgeport; Society for Savings, Hartford; and Northeastern Datacom, Inc., of Wallingford to establish and maintain a standby disaster recovery operations center. Cadre also offers space subscriptions and preemptable processing capabilities.

Summagraphics Corp. has received an order valued at \$150,000 from Bodine Corp. for a Summadraft Model 8200 computer-aided design drafting system. Summagraphics will also supply, as optional equipment, color CRT terminal displays for each of the two workstations in the new system.

Orders & Installations

Management Recruiters International, Inc. (MRII) has purchased Hewlett Packard Co.'s HP 125, which will be used in conjunction with programming provided by Systems Analysis, Inc. to serve MRII's network of company-owned and franchised offices throughout the country.

McDonnell Douglas Automation Co. has been awarded a three-year, \$50-million contract to process Medicaid claims for the New York State Department of Social Services. The contract is subject to two one-year extensions.

Scientific Systems Services, Inc.'s Electric Utility Division has been

awarded a \$3-million contract by the Maine Yankee Atomic Power Station for the design and installation of a new computer system.

Sperry Univac has received an order valued at approximately \$1.8 million from the city of Savannah, Ga., for a large-scale computer and terminals that will perform a variety of municipal government tasks for the city and surrounding Chatham County.

SDSystems has reached an agreement with Foxmeyer, a Denver-based wholesale drug supplier, to furnish computer equipment for Foxmeyer's Pharmdata processing network. SDSystems is a wholly

owned subsidiary of Syntech International, Inc.

Jersey Data Network, an organization of 11 savings banks located throughout New Jersey, has renewed its contract with the Thrift Services Division of Boeing Computer Services Co., a division of the Boeing Co. The new contract, which runs for three years, is valued in excess of \$1.6 million annually.

Condor Computer Corp.'s relational data base management system has been selected by the National Broadcasting Corp. for tracking contracts and residuals for celebrity personnel.

Digital Equipment Corp. has chosen Select Information System's word processing system to be available with its new Rainbow 100 personal computer.

Build your own computer for \$79.95



The Sinclair ZX81 personal computer kit

Imagine building your own computer for only \$79.95!

That's exactly what you can do with the ZX81 kit. It comes with all the parts you need and complete diagrams and instructions for putting it together. All you have to supply is soldering iron, solder, and a screwdriver. Plus, of course, a little bit of work.

But you get a lot more than several hours of kit-building fun. You also get a surprisingly powerful personal computer. The ZX81 hooks up to any TV for a 32-character by 24-line display (we provide the connecting cables). You can also use a standard cassette recorder to store your programs (again, we provide the cables).

Most important, you get a BASIC programming language that's powerful enough to challenge and interest the most experienced programmers. The ZX81 can handle multidimensional string and numerical arrays. It has full mathematical functions accurate to eight decimal places. Single-key entry for every command. Syntax error detection, debugging codes, and easy editing. Plus features that are ideal for creating games, such as 20 graphic symbols, continuous

display, and random number generator.

The ZX81 can be expanded too. You can increase the memory from 1K to 16K with our Memory Module for \$49.95. And you get a comprehensive manual that completely documents the capabilities of the ZX81, and teaches programming from the ground up.

In short, you get all the features that have made the Sinclair ZX81 the fastest selling personal computer in the world. And you get the satisfaction and fun of building it yourself.

A few years ago, this kind of computer power was simply unavailable to the individual. Even today, most personal computers are too expensive to buy for personal use.

But the ZX81 kit can be yours for only \$79.95. Take advantage of this unique offer today. To order, send the coupon along with a check or money order. Or for faster delivery, call our toll-free number and use your MasterCard or VISA.

To order call toll free: 800-543-3000. Ask for operator #509. In Ohio call: 800-582-1364; in Canada call: 513-729-4300. Ask for operator #509. Phones open 24 hours a day, 7 days a week. Have your

MasterCard or VISA ready.

These numbers are for orders only. If you just want information, please write: Sinclair Research Ltd., 2 Sinclair Plaza, Nashua, NH 03061.

| | | | |
|-----------------------|---|-------------|-----------|
| AD CODE 06CW07 | MAIL TO: Sinclair Research Ltd., One Sinclair Plaza, Nashua, NH 03061. | | |
| | PRICE* | QTY. | AMOUNT |
| ZX81 Kit | \$79.95 | | |
| 16K Memory Module | \$49.95 | | |
| Shipping and Handling | \$4.95 | | \$4.95 |
| *U.S. dollars | | TOTAL | |
| Name _____ | | | |
| Address _____ | | | |
| City _____ | | State _____ | Zip _____ |

Sinclair technology is also available in Times/Sinclair computers under a license from Sinclair Research Ltd.

sinclair

(Continued from Page 142)
rectors.

• Joseph O. Bentley Jr. has joined CCS, Inc. as senior vice-president and secretary-treasurer.

• Henry C. Montgomery has been named to the newly created post of executive vice-president and chief operating officer of Micropro International Corp.

• Harold F. Enright has been appointed vice-president, marketing and strategy, of Prime Computer, Inc.

• Richard F. Bretagne, has been appointed to the newly

created position of vice-president, product development, of Software International Corp.

• Kent Wilkins has been elected vice-president and controller; James W.A. Jacobson, vice-president of product and quality assurance; and Robert L. Hooper, vice-president of the Integrated Office Systems Division, of Anderson Jacobson, Inc.

• Francis Castagnede has

been promoted to senior vice-president of Tesdata Systems Corp.

• Lee G. Stevens has been named to the new position of vice-president of sales for R2E of America, Inc.

• Timothy Conley has been appointed vice-president of finance for Zentec Corp.

• Glenn D. Palmer has joined Productivity International, Inc. as vice-president, engineering.

• Robert A. Wainer has been promoted to vice-president, government systems, at Delta Data Systems Corp.

• Francis E. McInnis has been appointed vice-president of manufacturing at Signal Processing Systems, Inc.

• Bert T. Johnston has been named vice-president, marketing, for Ibx Computer Corp.

• Robert C. Reece has been

appointed to the new position of vice-president, operations, at Century Data Systems, Inc.

• Gayle C. Tinsley has been appointed senior vice-president, corporate development, for Docutel Corp.

• Bruce Smith has joined Software IG of North America, Inc. as senior vice-president, technology.

• William T. Baker has been named vice-president of manufacturing for American Microsystems, Inc., a subsidiary of Gould, Inc.

• Robert S. Steele has been promoted to the post of vice-president, marketing services, at Pansophic Systems, Inc.

• Donald J. Pate has joined Atasi Corp. as vice-president of marketing.

Executive Corner

"500,000 Real Estate Transactions Just Months After Installation—That's Reality!"

"The reality of Century 21 Real Estate Corporation's nationwide business was the need for 25 stand-alone computers to handle our 1.6-a-million yearly transactions. So, we selected a Microdata REALITY® computer system for each location, and in months, all 25 were fully operational.

"And not only was the equipment up and running, but also our people. We couldn't believe how quickly they learned to use the system. People with no computer know-how were producing with the REALITY system after just a few days. There was almost no interruption in our work flow."

Why is Microdata's REALITY system the choice of businesses like CENTURY 21? In a word, it's ease of operation. Almost anyone can understand Microdata's ENGLISH® retrieval language. It lets you talk to the system in

simple words and phrases. Without scanning through entire files, you can find exactly the data you need, in exactly the format you want it. It's also easy to get service and support. The REALITY computer system is backed by a customer service network that reaches across the country and all around the world. Should you ever have a problem, help is just a phone call away.



No wonder businessmen rate the REALITY system number one in its class year after year. You'll give the REALITY business computer system high marks, too. For complete information and a hands-on demonstration, write Microdata Corporation, P.O. Box 19501, Irvine, CA 92713. Or call toll-free 1-800-821-7700, ext. 122 (except Alaska and Hawaii), or 1-800-892-7655, ext. 122 (in Missouri) for the location of your nearest Microdata representative.

Microdata

We Build Understanding Into Computers.



Foreign Orders & Installations

Modular Computer Systems, Inc. (Modcomp) has received a \$250,000 order from Holset, a Huddersfield, England engineering firm. The order, which includes a Modac III process interface and two Classic 7820 processors, brings the total value of Modcomp equipment purchased by the company to \$1.5 million.

Virginia Communications Associates, Inc. has been awarded a \$5.1-million contract to supply the U.S. Air Force with microcomputer systems for individual Tactical Air Command units located in the U.S., Europe and the Pacific. The total value of the contract over a three-year period is expected to reach \$15 million.

The David Jamison Carlyle Corp. has received an order valued at \$750,000 from the Fourth Ministry of Machine Building in the People's Republic of China for Lear Siegler, Inc. video display terminals and Centronics Data Computer Corp. printers.

Concord Data Systems, Inc. (CDC) has received an order and option valued at approximately \$2.7 million for its 1200 bit/sec CDS V.22 data modems from the Swedish Postal Telephone and Telegraph. Deliveries will take place over the next 18 to 24 months.

Japan's third largest airline, Toa Domestic Airline Co., has implemented four new systems using a Sperry Univac 1100/62 computer supplied by Nippon Univac Kaisha Ltd., the Univac computer marketing joint venture in Japan.

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Kai-
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joint

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ORIGINAL MATERIAL AFFECT THE QUALITY
OF THE MICRO-EDITION. THE REPRODUCTION
OF PAGE 144 IS THE BEST COPY AVAILABLE.

position announcements

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POSITION ANNOUNCEMENTS



Increase your assets.

Whether you are a successful professional looking for career change and growth, or a corporate executive looking for the right data processing, accounting, financial or banking professional, you meet with success when you meet us at ROMAC.

Your assets will increase with our unique and uncompromising personal and professional approach.

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BUFFALO, NY
60 Lakefront Blvd
(716) 853-6203

CRANSTON, RI
1150 New London Av
(401) 463-7600

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111 W. First St.
(513) 461-1373

FAIRFIELD, CT
140 Sherman St.
(203) 255-9145

HARTFORD, CT
One Financial Plz
(203) 525-8037

NEWTON, MA
One Newton Exec. Pk.
(617) 969-4010

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(201) 845-7668

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(215) 568-5810

PORTLAND, ME
477 Congress St.
(207) 773-4749

ROCHESTER, NY
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(716) 232-4810

TAMPA, FL
215 E. Madison St.
(813) 228-4327

WINSTON-SALEM, NC
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Personnel Consultants

ARAMCO SERVICES COMPANY IN HOUSTON

DATA PROCESSING PROFESSIONALS

Enjoy living and working in the heart of the Sun Belt

When Aramco Services Company in Houston hires you as a data processing professional, you'll gain experience that you probably could not duplicate anywhere. And you'll live in one of the fastest growing metropolitan areas in the country.

Phenomenal overseas operations depend on Houston people

Aramco is the key company involved in the development of energy resources of Saudi Arabia. We need more computer professionals in Houston to support these vast overseas operations.

In Saudi Arabia, Aramco is involved in dozens of incredibly large and complex projects. Probably nowhere else in the world is modern technology being employed so widely. Aramco Services Company in Houston plays a significant role in all of it.

If you have a BS or a BA in Computer Science, Math, Business or a related field and a minimum of two years of data processing experience in a large IBM environment (3033, OS/MVS, JES2), we have the following openings now in Houston:

Systems Programmers

We are looking for several systems programmers with varying levels of experience ranging from a two-year programmer to an eight-year working supervisor. Experience in some or all of the following areas/skills are required: MVS/SE or SP1 internals, JES2, NJE, VSAM, IMS, TSO command language, SAS graphics, and support of IBM and non-IBM products. All positions have high visibility and user contact.

Systems Analysts

A systems analyst is needed to work on Aramco's purchasing system. You must have Fortran experience on a CHI 2130 or IBM 1130 in a time-sharing environment. Commercial applications desirable.

Data Base Analysts and Support Analysts

You must have a minimum of 2 years' experience in IMS system support including use of BTS, IMS utilities, DB performance and tuning tools—IMSPARS, IMSASAP, DB and DC monitors, etc.

Commercial Programmers

Your primary duties will include development and maintenance of software to support purchasing, shipping and financial activities of the company.

Required is 2 years of DP experience; PL1, OS/MVS, JES2, structured techniques experience; and experience with projects involving treasury, industrial relations, and payroll.

We also need Commercial Programmers with 3 years' experience and familiarity with PL1, TSO, IMS, DB/DC, OS utilities, and MARK IV/SAS.

Commercial Analyst/Programmers

You must have at least 3 years' experience in design, analysis and programming of commercial application systems, and at least 2 years' experience in IMS on-line DB/DC and PL1. ADF or MARK IV experience is required as well.

Standards and Procedures Analyst
You must have at least 3 years' experience

in data processing including systems analysis and technical writing. Experience with IBM TSO/SPF and SCRIPT/VS is necessary. Candidate will conduct search and analysis to insure quality and consistency of documentation and assist project teams in developing standard procedures and guidelines. Individual may also interface with user groups in a quality assurance role.

Engineering Support Analyst

A systems analyst is needed with seven years' experience. Project management experience preferable. Knowledge of higher programming languages, in particular MCAUTO'S Management Control Software (MSCS, COPEs, TMAPS, MAPS, and LISS), is needed. Analyst will work with Engineering clients defining project requirements, designing systems and implementing systems. Analysts will also work with Project Management teams to define reporting requirements.

Excellent compensation and benefits

When you work for Aramco Services Company, you'll receive an excellent compensation and benefits package, work in a pleasant environment, and have the additional advantage of paid parking or a company-subsidized van pool.

Interested? Send your résumé and we'll get back to you soon. Write: Aramco Services Company, F3038-2, P.O. Box 4534, Houston, Texas 77210.

ARAMCO SERVICES COMPANY

Arizona/California/Texas/Colorado/Florida SCIENTIFIC OR BUSINESS PROGRAMMERS

All fees and relocation paid. \$20-40,000

If you have a BSEE, BSCS, BS in Mathematics or Physics or equivalent, we need you right now.

For Business: OS/VS/IMS/CICS/MVS/JES Prog/Anal/Systems/Data Base. All large scale installations.

For Scientific: experience in the computer, communications, semiconductor, or aerospace/defense industries.

Your name, resume, and present employer will not be given out without your permission.

For sincere personal service, please send a confidential resume to:

Dan Pullman (602) 274-5660
PULLMAN PERSONNEL

3033 North Central Ave. Suite 401, Phoenix, Arizona 85012

SUNBELT

D.P. Professionals needed for our client companies in SE - SW. All Fees paid. Send resumes or call collect.

ANN BARKER
3401 West End Bldg., Suite 310
Nashville, Tennessee 37203
(615)-292-0931

DEALY ROURKE PERSONNEL

PROGRAMMER/ANALYST

Current, Inc. (Loart Press), a leading national manufacturer and marketer of greeting cards and fine stationery items is seeking a Programmer/Analyst. This position would be responsible for programming and analyst work in our systems services department. We are seeking a person with 3 years programming experience, 2 of which should be in COBOL.

If you're interested in joining the over 900 people who call Current, Inc. their home, please forward resume, salary history and requirements to:

CURRENT, INC.

Attn: Sam Sargent
3525 N. Stone, Dept. CA2 Colorado Springs, CO 80907

An Equal Opportunity Employer

position announcements

position announcements

Software Professionals, We Want You!

Join the team responsible for developing the world's largest and most advanced packet switching network. Join TYMNET, a wholly owned subsidiary of Tymshare, Inc.

Working at Tymnet provides you with the opportunity to excel in a dynamic and challenging work environment. Here you'll find job satisfaction, in addition to excellent salary and benefits.

Protocol Development and Support

Your main responsibility with Tymnet will be to develop and provide protocol support for our 1000-node international data communications network.

We're looking for programmers with a minimum of 2-3 years experience using real-time assembly language. You should also have a strong background in higher level protocols such as X.25, X.75, 2780, and 3270. A degree in Computer Science (B.S.) or the equivalent is required.

Implementation and Support

We need software support professionals with some project management experience. You'll be implementing various network communications projects and providing support to our existing private customers list.

Your experience should include a working knowledge of higher level protocols such as X.25, X.75, 2780, and 3270; and a background in real-time assembly language. You'll need a Computer Science degree, BSEE, or the equivalent. Management experience is desirable.

We need to fill these positions immediately! So, please send your resume in confidence to Tymnet, 2710 Orchard Parkway, San Jose, CA 95134, Attn: Gary Walker, Manager Technical Services

TYMNET An Equal Opportunity
Employer m/f/h

MVS PROGRAMMERS

The expanding M.I.S. department of Geisinger System Services is currently searching for special individuals to become part of its team. We are located in central Pennsylvania on the same campus as Geisinger Medical Center and provide computer support to a multi-corporation system.

The individuals we want to add to our team are:

SYSTEM PROGRAMMERS

BS with experience in MVS/SP/JES 2 and one of the following: IMS/DB, CICS, VTAM/NCP; able to set standard and determine methods for the technical environment and provide leadership in our conversion from Honeywell GCOS to IBM MVS.

PROGRAMMER/ANALYST

BS in Computer Science and/or related field or experience. We require 3 to 5 years COBOL programming experience with analytical duties. Additional experience in MVS, CICS and IBM/DB desired.

We offer a ground floor opportunity within a progressive environment for technical and professional growth. Of course our salary and benefits program is excellent.

Please submit a current resume with SALARY REQUIREMENTS to:

GEISINGER SYSTEM SERVICES

Human Resources
#23-10
Danville, PA 17822

Equal Opportunity Employer, M/F

EDP OPPORTUNITIES COAST TO COAST

Robert Half, staffed by EDP professionals for EDP professionals with 80 offices throughout the U.S., Canada & Great Britain, is the largest network of personnel consultants in the Data Processing field. And its establishment in 1946 also makes Robert Half the oldest. One call and you can search the local, national and international markets. All fees are paid by client companies, of course. The following is a partial listing of opportunities and locations:

BOSTON

HONEYWELL SPECIALIST
Dynamic, growth oriented EDP svcs org seeks tech astute COBOL P/A for new devel proj. Must have HONEYWELL mainframe bkgd w/on-line DBMS exp. Full interv & reloc exp pd + mortgage diff. Attractive scenic area. Salary to \$35,000

COBOL P/A - MAINE

Outstanding construction firm seeks methodical & practical COBOL specialist to devel new sys proj. IBM 4341 DOS/VSSE mainframe loc at corp hdqtrs. Interv & reloc exp pd. Rural country setting. Salary \$25,000

PROJECT LEADER

Estab mfr searching for MIS pro to guide small, prof team in major sys devel proj. State-of-the-art IBM shop with hi-visibility to corp mgmt. Pivotal, key pos. Interv & reloc exp pd with outstanding benefit pkg. Salary \$35,000

Gerry Battista
ROBERT HALF
of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200

PROVIDENCE

EDP AUDITOR

Fortune 500 co seeks sr EDP auditor with solid bkgd in acctg knowing audit procedures & EDP sys devel testing. OS JCL/COBOL knowl a must. BS degree in Acctg and/or Comp Sci desired. \$37,000

Bob Lathrop
ROBERT HALF
of Providence, Inc.
400 Turks Head Bldg.
Providence, RI 02903
(401) 274-8700

PALO ALTO SAN JOSE

SR SYSTEMS PROGRAMMER
Several positions for individuals with MVS, VM, VTAM, TCAM or NCP experience. Locations in the heart of Silicon Valley. \$40's

DATA BASE ADMINISTRATOR
Multiple openings in Financial and Manufacturing organizations. One position includes the #1 spot at a new data center. Low \$40's

PROGRAMMER/ANALYST
COBOL, ASSEMBLER, PL/I experience with Financial or Manufacturing applications. Mainframe or mini computer environments. Mid \$30's

Jim Dupre
Linda Strickland
ROBERT HALF
of Northern Calif., Inc.
2 Palo Alto Sq., Ste #212
Palo Alto, CA 94304
(415) 493-8700
675 No. First St., Ste 609
San Jose, CA 95112
(408) 293-9040

HARTFORD

PROJECT LEADERS

Hrtfd area mfg clients seeking indiv's with MRP, COPICS or MAPICS bkgd to direc new devel proj. COBOL bkgd + 3 yrs exp in mfg req for these exceptional oppty's.

Salaries to \$35,000 +

SYSTEMS PROGRAMMER

DOS/VS, 4300 series equip exp in generating and enhancing all operating sys. Will devel all future software activities for corp. Conn shoreline co.

Salary \$34,000

SYS CONSULTANT

Office sys, distrib proc, personnel computing exp qualifies for unique oppty to devel expansion of the computer to "end users". Cent Conn loc.

Salary open DOE

VM SOFTWARE

Conn expansion in VM/370 clients! Needs exp'd indiv to assume corp planning & install. Min 2 yrs exp req.

Salary to \$37,000

PERF PLANNING

Conn data ctr planning function seeking indiv to eval, optimize & do perf-capacity analysis on multi IBM sys. 2+ yrs exp req. Salary to \$34,000 +

DATA COMM'S

Major S New Eng IBM/MVS client expanding TP network! Exp'd software & mgmt oriented indiv's in NCP, VTAM & network planning urgently needed. Full benefits with incentive (bonus) plans for exceptional professionals.

Salaries to \$38,000

CICS/IMS

Conn growth industries expanding info DB/DC apps. Min 3 yrs exp in either software qualifies for full reloc expenses with starting salaries to \$38,000

Stan Durbas
Burt Israel
Carol Wilson
ROBERT HALF
of Hartford, Inc.
111 Pearl Street
Hartford, CT 06103
(203) 278-7170

BUFFALO

MIS DIRECTOR

Ins co loc Cent NY needs DP pro with knowl of property casualty ins software pkgs such as ISA V4. Excellent oppty for mgr to advance career. Pos rpts to co Pres. Salary \$40,000

PROGRAMMER/ANALYST
Lge corp data ctr has openings at several lvls from analyst/prog to proj mgr. Cand must have CICS in an IDMS environ. Banking, financial or acctg apps is best exp. State-of-the-art hardware + prof peer group enhances these pos.

Salary \$24-\$38,000 DOE

Bob Collins
ROBERT HALF
of Buffalo, Inc.
1310 Liberty Bank Building
Buffalo, NY 14202
(716) 842-0901

TULSA

PROGRAMMING MANAGER

Large bank wants person with 3+ years NCR Criterion experience. FOCIS/CIF, NEAT III Language, and/or banking applications all pluses. An excellent benefit package.

To \$30,000

ROBERT HALF
of Oklahoma, Inc.
5840 S. Memorial Dr. #217
Tulsa, OK 74145
(918) 627-1600

NEW ORLEANS

SR ANALYST/RPG III

Multi million \$ energy firm is seeking exp'd Sys 38 individual. Excellent benefits & relo.

\$30,000

INSURANCE/COBOL

COBOL plus heavy ins a must. Gen'l bus appls a plus. CICS will insure you the position.

\$30,000

PROG/ANALYST/4300

Country living. Close to large town. Must 2+ yrs COBOL CICS/VSAM/DL1 a plus.

To \$35,000

ROBERT HALF
of Louisiana, Inc.
4630 One Shell Square
New Orleans, LA 70139
(504) 524-3773

ORLANDO

PROG/ANALYST

Excellent oppty for right person with 1 yr exp S38 RPG III.

To \$28,000

PROG/ANALYST

Local div of Fortune 100 co needs CICS, DL1 under VS.

To \$26,000

PROG/ANALYST

Must have 5+ yrs exp on lg IBM or HP3000 in mfg appl IMS + + +.

To \$27,000

Pam Evans
ROBERT HALF
of Orlando
2699 Lee Road, Suite 415
P.O. Box 17892
Orlando, FL 32800
(305) 628-2836

PALM BEACH

MGR MAS

Exciting opportunity in Palm Beach! Prestigious local CPA firm in urgent need of manager to take charge of consulting staff. Your knowledge of automated accounting systems development is essential. You will be involved in accounting systems design and some tax and audit assignments. Prior CPA firm experience helpful. Amiable work environment. Great benefits and Fees Paid.

\$40,000

Bonnie Gouz

ROBERT HALF
of Miami, Inc.
2655 Le Jeune Road
Coral Gables, FL 33134
(305) 447-1757

WASHINGTON

PROJECT MANAGER

DC Firm seeks Systems Analyst to provide technical guidance for development team. All new projects. No programming.

\$33,000

ROBERT HALF
of Washington
7316 Wisconsin Ave., Suite 401
Washington, DC 20814
(301) 652-1960

ROBERT HALF

ATLANTA

COMMUNICATIONS SYSTEMS SPECIALIST

Minimum of 2 to 5 years communications systems exp with strong communications skills. Successful applicant will give detailed and conceptual instruction, as well as executive briefings. **\$45-50,000**

DP MANAGER

Fluent in COBOL, RPG and BASIC. Supervise installation, design and maintenance work. Prefer Burroughs bkgd, leadership skills; prior mfg exp. **\$35,000**

PROGRAMMER/ANALYST

COBOL programmer with at least one year of exp on HP3000 equipment. Some RPG a+. Entry-level position that has tremendous opportunity for professional growth.

Terence White

ROBERT HALF

of Atlanta, Inc.
3379 Peachtree Rd. N.E.
P.O. Box 10201
Atlanta, GA 30319
404-266-2153

ST. LOUIS

SR OPERATIONS ANALYST

Prestigious manufacturer with major hospital. Services dept seeks hospital Op Analyst with exp in systems architecture, Data flow modeling and programming ability. Excellent relocation pkg and fringes. **To \$40,000**

DATA PROCESSING

CONSULTANT

Prominent consulting firm has need for a degree professional with IMS DS/DC experience. Knowledge of application development methodologies preferred. **\$25-35,000 plus Bonus**

TELECOMMUNICATIONS SYSTEMS PROGRAMMER

Major manufacturer seeks a DOS/VSE systems programmer who is familiar with VTAM and CICS. Requires 5 yrs experience. Individual must be self-motivated and able to train other S/P's. **\$30's**

CICS PROGRAMMER/ANALYST

Major St. Louis based financial institution seeks a COBOL programmer/analyst with 3-4 years experience with on-line applications. Must have a degree and 1-2 years with CICS Command Level. Great benefits. **To \$28,500**

Randy Pace

Delores Cook

ROBERT HALF

of St. Louis,
7733 Forsyth
St. Louis, MO 63105
(314) 727-1535

GREENSBORO

PROG/ANALYST

Excellent growth for PIA with IBM MVS & COBOL. Various positions. Salary **\$23 to \$32,000**

IBM SYSTEM 38

Outstanding opp for PIA with RPG II & Sys 34 or 38. **Salary \$25,000**

PROG/ANALYST

Rapidly expanding co offers excel opp for PIA exp in COBOL & OS. Bala +. **Salary to \$24,000**

Larry Brooks

ROBERT HALF

of North Carolina, Inc.
Wachovia Bldg. Suite 1117
Greensboro, NC 27401
(919) 274-2448

JACKSONVILLE

PROGRAMMER/ANALYST

Daytona Beach based corporation is seeking an individual with at least 3 years experience using COBOL in a DOS/VSE environment. In addition a background in Insurance would be helpful. Fee Paid By Client. **Salary to \$25,000**

Doug Cook

of Jacksonville, Inc.
9550 Regency Square Blvd.
Suite 213
Jacksonville, FL 32211
(904) 721-0970

MINNEAPOLIS ST. PAUL

SYSTEMS PROGRAMMER

Extraordinary opportunity for advancement available with leading company in a medium sized MW city. Expanding DP dept wants you to spur co growth with your creative systems programming and leadership abilities. System 4341. Knowledge of state-of-the-art IBM mainframes and CICS a must. Pluses are VM, DOS/VSE & ASSEMBLER. Relocation Paid. **Salary to Upper \$20's**

Mark David

Leah Duncan

of Minnesota, Inc.
2236 IDS Center
Minneapolis, MN 55402
(612) 339-9001

KANSAS CITY

SYSTEMS PROGRAMMER

Prestigious KC firm is looking for MVS systems expert. Must have at least 5 years systems with broad base in DP. Excellent benefits in this advanced state-of-the-art shop. **Salary to \$40,000**

PROGRAMMER ANALYST

Industry leader seeks FORTRAN expert to join their new development group in developing proprietary software. Familiarity with CAD/CAM, graphics, and assembler beneficial. **Salary to \$30,000**

George Waterman

ROBERT HALF

of Kansas City

127 W. 10th St.

Kansas City, MO 64105

(816) 474-4583

FORT LAUDERDALE

TELECOMMUNICATIONS

CONSULTANT

Dynamic South Florida client based in suburb of Miami, is seeking a professional consultant to design and implement a telecommunication system. Must have two years experience with large scale IBM Hardware/Software networks, feasibility studies and analysis. Position requires a degree or heavy experience will be considered. Knowledge of voice and data in a common carrier environment. 50% travel. Excellent salary and comprehensive benefits package. Call today. Fee and Relocation Paid. **Salary \$36,000**

Jack Subwick

ROBERT HALF

of Ft. Lauderdale, Inc.

7770 W. Oakland Park Blvd.

Suite 410

Ft. Lauderdale, FL 33321

(305) 742-0200

ALABAMA

PROGRAMMERS

Many openings exist in the South and Southeast for COBOL and Assembler programmers with a min of 1 yr experience. **Salary with degree \$25,000**
Salary without degree \$21,000

UNIVAC 1100

Several openings in a billion dollar, recession proof industry exist for Univac 1100, DML, TIP programmer analyst and system analyst. 2-5 yrs experience. **Salary to \$30,000**

SR EDP AUDITOR

2 openings exist in the Alabama area for experienced EDP Auditors with programming and systems backgrounds. Excellent relocation and benefits. **Salary to \$30,000**

Tom Uhlis

ROBERT HALF

of Alabama

3534 Independence Drive
Birmingham, AL 35209
(205) 879-4253

SEATTLE ANCHORAGE

PROGRAMMER/ANALYST

Excellent opportunity for individual with 3+ years COBOL experience with IBM OS in bank/thrift deposit applications. **To \$30,000**

Marlie Peterson

ROBERT HALF

of Seattle, Inc.

600 University Street

Suite 2328

Seattle, WA 98101

(206) 624-9000

DAYTON

Your data base experience is a valuable commodity in today's job market. Consider: Truly growth opportunities - both personal and financial. IF you meet at least 3 of these requirements:

...2+ yrs COBOL (DOS or OS)
...TSO/SPF
...CICS or SHADOW II or IDMS/DC
...IMS or IDMS or TOTAL
THEN Call Susan Robinson or Jim Lee to discuss.
ELSE Try ROBERT HALF when you're ready. Fee paid.

Susan Robinson - Jim Lee

ROBERT HALF

of Dayton, Inc.

First National Plaza

Dayton, OH 45402

(513) 224-0600

MILWAUKEE

RPG II PROGRAMMER

Large Texas oil company seeks person with strong programming skills. Experience in RPG III & S/38 could be your ticket into this state of the art, automated job stream and operational environment. **\$30,000**

TP NETWORK ANALYSTS

Is your company suffering from the current economy? A Milwaukee-based financial firm that does well regardless of the economy seeks an individual to analyze, select, install & maintain a complete TP communications network. **\$30-35,000**

ROBERT HALF

of Wisconsin

777 E. Wisconsin Avenue
Milwaukee, WI 53202
(414) 271-HALF (271-4253)

DALLAS

DATA BASE ANALYST

Must have one to two yrs experience in the design of IDMS data bases. IBM OS COBOL and teleprocessing experience also mandatory. **To \$30,000**

SR PROGRAMMER ANALYST

Need an individual with strong manufacturing background. Requires four yrs experience in a large scale IBM environment utilizing CICS or Envision 1. **To \$32,000**

John Staiger

ROBERT HALF

of Dallas, Inc.

Two NorthPark East, #750

Dallas, TX 75231

(214) 363-3300

CHICAGO

SYSTEM SOFTWARE

PROGRAMMER

Do you enjoy the COUNTRY LIFE yet want the advantages of a BIG CITY? Excellent relocation package includes mortgage differential. Manufacturer of staple goods seeking top-notch OS/VS1 or MVS Programmer. Will consider a sharp DOS System Programmer with CICS or DL1 experience. **\$35,000**

Sandy White

ROBERT HALF

of Chicago, Inc.

35 E. Wacker

Chicago, IL 60601

(312) 782-6930

SOUTHERN CALIFORNIA LOS ANGELES

SYSTEMS PROGRAMMERS

Multiple openings provide flexibility, alternatives and excellent career growth.

MVS to \$45,000+

VSE to \$40,000+

VM to \$40,000+

VS/1 to \$40,000

Joe Reese

ROBERT HALF

of Los Angeles, Inc.

3600 Wilshire, #2000

Los Angeles, CA 90010

(213) 386-6805

COMMERCE

SYSTEMS ANALYST

PROJECT LEADER

Excellent opportunity to advance career. 3+ years IBM COBOL with supervisory exp or potential. Top professional environment. Fee paid.

Bob Dack

ROBERT HALF

of Commerce, Inc.

6252 E. Telegraph

Commerce, CA 90040

(213) 721-2187

ORANGE COUNTY

SYSTEMS PROGRAMMERS

Work in sunny Southern Calif in the heart of Orange County. First class office environment, state of the art large scale IBM systems. Superb growth potential. Requires solid bkgd, combining educ and work exp in MVS and familiarity with CICS and/or IMS internals. Career opp to \$40,000

Al Handler

ROBERT HALF

of Orange County

2333 N. Broadway, #200
Santa Ana, CA 92706
(714) 835-4103

SAN ANTONIO

SR SYSTEMS ANALYST

Degree preferred. Analyst for at least 5 yrs in Cable Television industry. Need to be an analyst on the acctg apps (billing, etc) not production apps. Expanding, growing company with exceptional benefits/earnings potential for the right applicant. **\$OPEN**

USER INTERFACE/

CORPORATE SYSTEMS

Degree required. 5 plus yrs in DP with at least 2 yrs in user interface role. Will be comm with appls division and field users. Heavy financial bkgd a real plus. Company is expanding, not replacing, and needs one good person for this very important and responsive position. **\$25,000**

SR ANALYST

Degree nice, not required. IBM large system in COBOL a MUST. Converting from 34 to 4341 plus new appls. Job is with high visibility co and requires good comm skills. Good upward growth. **To \$28,000**

DIR OF SYS DEVELOPMENT

Degree required, MBA a +. 10 plus yrs in DP with at least 5 yrs in banking firm. Will direct efforts of Systems/Programming staff. IBM environment with heavy correspondent banking. Very visible and excellent benefits. **Mid \$40's**

All positions above and many more are in Texas, where "Long

Necks", "Armadillos" and the

"Cotton Eyed Joe" call home.

Bob Baldaul

ROBERT HALF

of San Antonio, Inc.

First International Bank Tower

Suite #850

San Antonio, TX 78201

1-800-531-5402

In Texas Dial (512) 736-2467

AUSTIN

COMPUTER MKTG MGR

Degree +. Must have mktg mgmt skills & computer related technical experience. Will set goals, procedures & establish closing practices. Specialize in Mini & Micro Units. **\$OPEN**

PROGRAMMER/ANALYST

Degree in related field. 3.5 GPA + insurance bkgd. OS Environment. Potential to become DP Head. **\$25,000**

Tina J. Romans

ROBERT HALF

of Austin, Inc.

400 E. Anderson Lane #334

Austin, TX 78752

(512) 835-0883

TAMPA

SYS PROG

Large IBM Hdwe DOS, OS or MVS Cobol-Sysgens-Dept expanding CICS/on line/IMS great. **\$32,000**

PROG/ANAL

Natl Corp seeks exp with DL/1 Min 1 yr-DOS, OS or MVS-Cobol. Any data base a plus. **\$20,000**

SR ANALYST

Div of Natl Corp requires pro MET insurance background 3 yrs exp in sys design-IBM-On line-Prior Cobol prog exp. **To \$38,000**

Stan Allen

ROBERT HALF

of Tampa, Inc.

1311 North Westshore Blvd.

Tampa, FL 33607

(813) 876-4191

NEW YORK

SOFTWARE MANAGER

(2) 4341'S CICS/VS

FREE CAR

Prominent national company located in Rockland County, is recruiting for a Software Systems Mgr with CICS/VS and teleprocessing expertise. Assume responsibility for maintenance, de-bugging and installation of CICS/VS. Supervise staff of four systems programmers in this state-of-the-art environment which consists of (2) 4341'S DOS/VSE, CICS/VS, ACS/VTAM, ACS/NCPC, VSAM, ICFF and 450 IBM on-line terminals. Unique company benefits include FREE CAR, bonus, company gym, plus lots more. Fee Paid. **\$40,000**

MICRO'S

PASCAL

Our client, an internationally recognized firm, located on Park Avenue, has a situation available for an extremely talented and professional Programmer/Analyst with strong programming background in PASCAL. Knowledge of micro computers essential. Handle entire integration of micro based systems within the executive offices of the firm. Very high visibility. College degree required. Fee Paid. **\$34,000**

SYSTEM 38

ALL DEVELOPMENT

Privately held midtown mfg co has a position available for a senior staff member to develop new on-line application for their SYS 38. Entire conversion has been completed. 3+ years experience required along with hands-on experience with the SYS 38 and RPG III. Excellent growth position as they expand DP staff. Fee Paid. **\$35,000**

HP 3000

COBOL DEVELOPMENT

An industry leader and one of the fastest growing companies in the US is seeking a knowledgeable COBOL programmer with 3+ years experience. Must have HP 3000 background and knowledge of Image, Query and View. College degree required. Develop your technical and business skills and be recognized in this position. Outstanding management team. Fee Paid. **\$30,000**

ROBERT HALF

of New York

522 Fifth Avenue

New York, NY 10036

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Software Development

Innovative Developments Start at Wang.

As the leader of the computer-driven Office Automation market, Wang stands 341st among the Fortune 500. With over a billion dollars in revenues, we attribute our success to the inspiration, careful thought and dedication of our people. At Wang, we recognize talent and reward contributions - professionally and personally.

Right now, we're looking for more software development people to help shape the future of the Wang VS - a 32-bit interactive virtual memory office automation system supporting data processing, word processing, graphics and networking.

Software Tools - Programmer Productivity Aids

Senior level professionals to design and build a state-of-the-art interactive development environment for the data processing applications developer. Requires strong track record in development or research demonstrating an in-depth understanding of common high-

level commercial or implementation languages. Our areas of interest include: very high level languages; language-based editing; symbolic debuggers; design languages; application generators; documentation generators; testing tools; source code control systems.

Business Graphics

Participate in the design and implementation of interactive color business graphics involving human engineering and integration of graphics with high-level language applications, data base management systems and word processing. Requires experience in development/use of end-user graphics facilities within a data processing environment. Experience in the use of

graphics devices from multiple vendors helpful. Projects include: business graphs, text charts, structure charts, interactive illustration, menu driven interfaces, thematic mapping and organization charts.

Other opportunities exist in compiler, operating system, data base and networking development.

See us in Anaheim.

Contact Carl Schwarz or Mike Albert, June 13-17, at the Disneyland Hotel, Anaheim, or send your resume to Ellen Wyman, Wang Laboratories, Inc., One Industrial Avenue, Lowell, MA 01851.

We are an affirmative action employer.

WANG

The Office Automation Computer Company

**SALES MGR
MIDWEST**

DATEC, INC., a rapidly expanding mfr of Data Communications Equipment is seeking a dynamic sales professional with strong sales skills, management exp, and the ability to develop and manage its distributor network in the Midwest.

Only those who have demonstrated this level of professionalism and have a minimum of 3-5 yrs sales/sales mgmt exp need apply. Please call or send resume to:

MS. MARIANNA PARTRICK
919-929-2135

DATEC, INC.
200 Eastown Dr, Suite 116
Chapel Hill, N.C. 27514

Equal Opportunity Employer M/F

**DATA PROCESSING DIRECTOR
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You will be working on varied and diverse projects. Requires BS/BA degree in Computer Science, Math, or Business Administration. COBOL essential.

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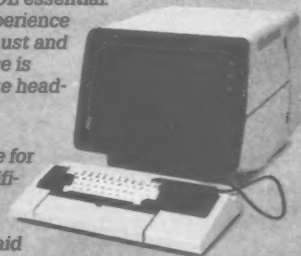
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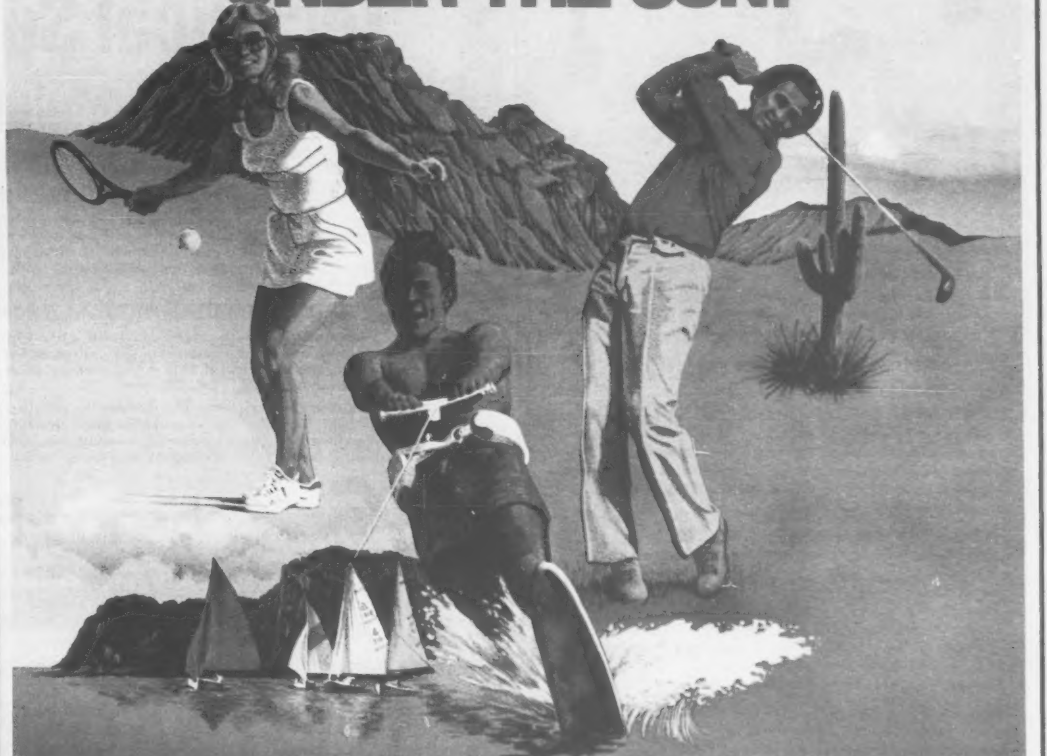
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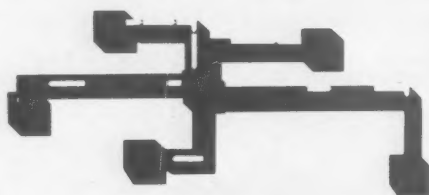
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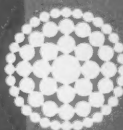
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Data Processing

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Individual will be responsible for testing new and modified software, database management and hardware/software

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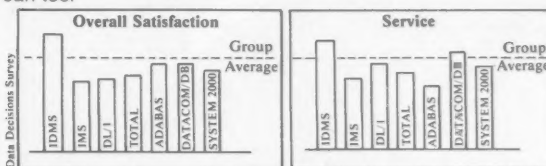
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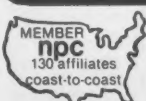
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NYSE mfg HQ in NE PA reqs 8-10 yrs DP exp of which 5 yrs incl Data Base exp & MGMT responsibility. DBMS or IMS very helpful. Organize & structure data resources of corp MBA ptd. OUTSTANDING BENEFITS incl excel RELO PKG

Contact: Regine Nordeman
ROBERT HALF
OF PHILADELPHIA, INC.
2000 Market St., Suite 706
Philadelphia, PA 19103
(215) 568-4580

data processing

SOFTWARE DIRECTOR

We are seeking a highly motivated individual to manage our micro-computer software division. Bachelor degree required with 5-10 years experience in general management and 1-2 years in micro-computer software industry. Must possess a high degree of judgement and the ability to deal with senior executives. An understanding of the software market, its direction, and the competition, is imperative.

This key position carries profit and loss responsibilities, supervision of the development, marketing, production, and administration of the software products, and the responsibility for the manner in which the business of the software division is conducted.

We offer an excellent compensation and benefit package, and solid growth prospects with this unit. Please send resume, including earnings history, in confidence to:

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Exciting Careers In Software At ITT Courier

Discover the new look and spirit of one of the most innovative companies in computer terminal systems technology today. ITT Courier is embarking on an exciting new era. And you could be part of it. Your talent, knowledge and experience can mean great things for you at ITT Courier. You'll be part of a team of experts who know - and demand - the very best. You'll also be backed by the resources of one of the world's great companies. Your salary, your benefits, and your opportunities for real growth are outstanding. Discover just how solid and satisfying a career at ITT Courier can be!

SYSTEMS ARCHITECT

Working from marketing requirement statements and the strategic product plan, you will define system architectures which will be the basis for the expansion of our product lines. You will also analyze and establish the trade-offs between hardware and software implementations and lead the transition into the development organizations. 15 years demonstrated success in hardware and software development in computer systems involving telecommunication is desired. Recent success in technical leadership of major systems architecture is required. A MSEE, MSCS or equivalent is preferred.

SOFTWARE STAFF ENGINEER

You will assume the lead technical engineering position for software product development. You must have a proven track record for innovative design and have ability to provide technical leadership. At least 6 years experience and a BSEE/BCSC or equivalent is preferred.

SOFTWARE ENGINEERS

You will participate as a key team member in the development of product software. These positions require experience in assembly language programming for product development. A BSEE/BCSC or equivalent is preferred.

SOFTWARE ENGINEERS

You will be programming in the IBM host computer using VTAM. Familiarity with SNA/SDLC host implementation and communications front-end procedures is preferred. A BSEE/BCSC or equivalent is desired.

At ITT Courier, your contribution means career growth opportunities and reward. In addition to excellent salaries, we provide an outstanding fringe benefits package. Interested candidates should send their resume to: Pat Taylor, ITT Courier Terminal Systems, Inc., P.O. Box 29039, Mail Stop A12, WC46, Phoenix, Arizona 85038.

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ITT Courier Terminal Systems, Inc.

MANAGER OF MICROPROCESSOR SOFTWARE DEVELOPMENT

We are a division of a Fortune 500 electronics corporation located in an attractive, metropolitan sunbelt location involved in the development of state-of-the-art microprocessor based communications and computer products and systems. We are seeking an experienced Microprocessor based Manager to be responsible for the architectural definition and development of a new line of products. Reporting to the Vice-President of Engineering, your responsibilities will include product formulation and direction of an engineering development team of (30) employees through all phases of system development, beginning with problem definition through to customer installation.

You must have a BSCS or BSEE plus 8 or more years broad software background including applications, software development and microprocessor experience in technical/managerial functions related to design and development in an R&D environment.

Compensation package for this highly visible position is to \$50K base + bonus.

All inquiries will be regarded in the strictest confidence. Your resume with salary history should be sent to:

BOX MBWC-1489

261 Madison Avenue, New York, New York 10016
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SENIOR SYSTEMS PROGRAMMER/ANALYST

Join the Corporate Data Processing staff at National Health Laboratories in Dallas, TX. Design, program, and install on-line data systems nationwide, utilizing Digital Equipment Computers. Require College degree, preferably in Computer Science and three years experience. Desire mini-computer experience. Send resume to:

National Health Laboratories Incorporated
10300 N. Central Expressway
Meadow Park Central IV, Suite 220
Dallas, TX 75231

MANAGER DATA PROCESSING

Rapidly expanding 560-bed acute care facility in Baton Rouge, LA is accepting applications for the position of Data Processing Manager. This position as head of a newly created department of Data Processing will report directly to the director of finance. An excellent opportunity exists to identify data processing needs, build a staff and develop appropriate supporting software.

The successful candidate will possess a B.S. degree in data processing, show progressively responsible experience in a health care environment and have excellent written and verbal communications skills. Interested applicants should respond by resume with salary requirements to:

Personnel Department
Our Lady of the Lake
Regional Medical Center
5000 Hennessy Blvd.
Baton Rouge, LA 70809

DATA PROCESSING MANAGER

Southeastern multi-magazine publisher has need of experienced manager with strong technical background; ability to communicate with users and to direct staff of programmers and data entry department. COBOL a must. Experience with on-line equipment or NCR equipment helpful. Excellent career opportunity for right person. Salary commensurate with ability. Send resume and salary requirement to:

CW-A3267
Computerworld
Box 880
Framingham, MA 01701

GROWTH OPPORTUNITY

One of the East Coast's largest and fastest growing data processing service bureaus is expanding its PHILADELPHIA and NEW YORK operations and is opening new facilities in CHICAGO. We are aggressively seeking top caliber personnel for all 3 conveniently located offices. These are all excellent growth opportunities requiring highly motivated and success oriented professionals. The following openings exist at all 3 locations:

MARKETING

Applicants for the positions of Marketing Representative must have 5 or more years of sales experience in a service area environment demonstrating a successful history of marketing to a variety of commercial accounts.

SUPPORT

Technical support is provided to our growing customer base by a Customer Support Analyst. Responsibilities will be varied but will include: monitoring installations, customer training, and overall support of a specified customer base. We require 3-5 years data processing experience, including a working knowledge of 2 or more programming languages, familiarity with large scale IBM hardware and user interface. Only those candidates who present a professional image and have strong communication skills will be considered.

To find out more about these exciting career opportunities send resume along with salary requirements to:

S-4, P.O. Box 1924
Philadelphia, PA 19105

Minority applicants are encouraged to apply

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You've got the skills - I have the Sunbelt openings you're looking for!! My 20+ years of DP Recruiting has allowed me to establish a firm rapport with "Fortune 500" clients that seek professionals with your skills. I deal directly with these companies, and you deal directly with me. (Not other recruiters or branch offices) Listed below is a partial list of locations. (Yes I have made placements in all of them)

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HOUSTON
PHOENIX
WINSTON-SALEM
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DALLAS
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DENVER
NEW ORLEANS
RICHMOND
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INTERESTED!!!! Send me a resume or call me collect (904)-398-7371 (I'm on the phone a lot - leave a number if I'm busy - I'll get back to you!) Our clients assume all fees including interviewing and relocation costs.



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Academic Computing Center

Systems Support/Programming
Clarkson College of Technology, in upstate New York, is seeking individuals with experience in one or more of the following areas: system support and enhancement, development using both machine-level and high-level programming, and telecommunications. The Schuler Resources Center furnishes the College with central computing facilities for instructional, research, and administrative functions. Presently installed is an IBM 4341 Group 2 with 120 ports, running MUSIC and OS/VS1/HASP under VM/370. A VAX 11/780 with 32 ports is scheduled for installation in June, primarily for graphics applications. A broadband cable network using X.25 packet switching will provide access to these and future systems throughout the campus. Clarkson plans to provide to the students and faculty a comprehensive network of computing capabilities, including widespread use of personal computers.

Our systems group operates in an open environment, where each individual is encouraged to promote and develop ideas into actively supported projects. We offer an excellent benefit package, and our employees have the opportunity to enter Bachelors, Masters, and Doctoral degree programs. Send resume and salary requirements, in confidence, to: Richard D. Valente, Schuler Resources Center, Clarkson College, Potsdam, New York 13676.

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EOE m/f

DIRECTOR OF DATA PROCESSING

Downtown Detroit Corporation seeks a qualified person to manage large scale mini-computer operation, interface with users and build staff to convert users' needs into sophisticated applications.

Applicant should be experienced in design and implementation of telecommunication network systems, data base design, and applications-oriented programming. Salary commensurate with experience and background.

Reply to CW-A3266
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Framingham, MA 01701

INSURANCE DP

Beat this recession! Opportunities abound with several New England insurance leaders. Extensive growth has created immediate needs in state-of-the-art mainframe IBM environments. OS/MVS, CICS, Data Base, etc. Openings include: Programmers, Analysts, Technical Consultants, and Project Leaders to name a few. All offer excellent salaries and above average benefit plans, with full relocation allowances. For more details on these exciting opportunities, call or write to Jay Scully.

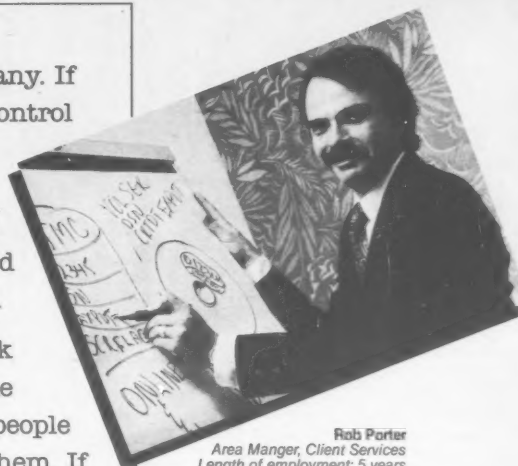
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"It's a very fast-growing company. If you want the opportunity to control your own destiny and prove your worth, this is the place. Seriously, if a person wants to rise to the occasion and succeed at UCC, they're free to do that.

The software group that I work in is second to none. I have the opportunity to hire the right people and make things happen for them. If you want to move to different areas of the company, there's a way for that to happen also. You're looked at as a person first and a cog in a wheel about third."

Rob Porter

*Your future is at UCC.
Ask our people.*



Rob Porter
Area Manager, Client Services
Length of employment: 5 years

Rob's career in UCC is paralleling the company's growth... strictly up! The Software Group of University Computing Company has these current openings for experienced professionals:

- Software Sales Representatives
- Systems Programmers - IBM
- Sr. Programmer Analyst - IBM Banking and General Accounting
- OS Systems Designers - IBM
- And more. These are just a few of the opportunities.

Several positions require nationwide travel, light programming and heavy user contact.

WHEN IT COMES TO YOUR FUTURE YOU MAY HAVE TO SETTLE FOR MORE AT UCC. JUST ASK OUR PEOPLE.

Call our Human Resources Department today at (214) 353-7627 for more information. Or, send your resume to: Pam Curry/University Computing Company/UCC Tower, Exchange Park/Dallas, Texas 75235.

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1414 22nd Street, NW
Washington, DC 20037

The Department of Urology at the Baylor College of Medicine seeks a "self-starter" to manage and program a multi-user Cromemco System II running Cromix. Experience with the Cromix or Unix operating systems is a big plus.

Please send resume to:

Department of Urology
Baylor College of Medicine
Houston, Texas 77030

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ANALYST**

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Our continuing growth has created a new position for an individual to install Qantel Model 231 computer systems in several Southeastern locations, to be based out of Jacksonville. Experience in application and program design is essential, as is in-depth experience with Qantel computer, QICBASIC language and Qantel BEST operating system. Inventory control system and financial application experience is required, and important pluses include experience in IBM 360/370/4300 in VM, OS or DOS, and teleprocessing between computers of the same or different types.

If you have the expertise that requires minimal assistance and can interface well with senior management, we offer a salary in the mid to high 30's and excellent benefits including fully paid relocation. For prompt, confidential consideration, send your resume with salary history to:

unijax

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Software R&D Professionals:

Show off Your Talents at the NCC

While attending the NCC, this is the ideal time for you to consider working in one of the most desirable locations of Texas, where the cost of living is low and the opportunity high. Our client, a premier software company in computer-based decision support systems, is growing rapidly and they're willing to offer the right individuals a career with tremendous growth potential and innovative rewards.

We will be conducting interviews at the NCC for exceptional software development professionals to join their expanding and aggressive Research and Development organization.

Several positions are available for talented individuals—from graduates with a BS in Computer Science and 2-3 years' experience to seasoned professionals with several years of experience.

Specifically, they're looking for individuals with demonstrated success in the design and implementation of software applications, preferably in modeling/planning languages on:

- Personal desk-top micro-computers, preferably individuals with experience using the IBM personal computer. (four openings)

- Minicomputers using FORTRAN and/or ASSEMBLY language. Ideal candidates would have successful experience programming on the newer 32-bit micros and other popular minis, such as Wang. (four openings)

- Superminis and/or mainframe computers, using FORTRAN and/or ASSEMBLY language. (four openings)

- One opening in each of these areas: Graphics; Data Base Management; Accounting; and Statistics. Integration Specialists in these areas need market vision and technical expertise in any high-level language. Here, you'll act as company liaison with executives in other software vendor companies. Outstanding presentation and communication skills are a must.



While attending the NCC, to arrange a convenient local interview call Alan H. Silva, at the Space Center Quality Inn, 713-332-3551.

If you are unable to meet with us at the show, forward your resume or a profile of your background, to Alan H. Silva, President, The Adalcar Group, Ltd., Buckminster Place Ext., 561 Union Ave., Framingham, MA 01701.

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REQUIREMENTS: Minimum of five years experience with at least two years in a supervisory position. Bachelor's degree in math, physics, or engineering, and master's in Computer Science.

LOCATION: St. Louis metropolitan area, West County.

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Applicants should have at least eight years of experience primarily in systems analyst function and including supervisory responsibilities. You should also have a thorough knowledge of IBM 4300/370 hardware capabilities including data base retrieval systems, operations research techniques, decision logic tables, teleprocessing/telecommunications principles, and complex systems design. You should be proficient in programming COBOL and knowledgeable of assembler languages. Current or recent involvement in development of a major automated logistics system is a must.

SENIOR SOFTWARE SYSTEMS PROGRAMMER

Applicants should have at least six years of experience, including three years recent involvement in programming file structure and design, data base design and management, data communications design concepts, system programming, access methods, line control techniques, and DOS/VSE system programming. Experience must include IBM 4300/370 hardware architecture as well as software expertise in COBOL, RPG, POWER/VSE, JCL, CICS/VSE and CICS/VSE system generator, and PTFs.

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Send your resume in confidence or call Mr. Williams toll-free at 800/424-3755 for additional information.



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For Computer Center, King Fahd University, Saudi Arabia. Responsible for software selection, hardware review, basic system design, project management and hiring/training additional staff. Center supports academic and administrative computing for 5 college university. Req: B.S. in Computer Science or related field, 3-5 years experience Systems Analysis/Programming. Knowledge of BASIC, COBOL, FORTRAN, ASSEMBLER and PASCAL. Familiar with Data General, Tektronix and IBM 4300. Arabic desirable. Two year assignment. Excellent salary and fringe benefits. An equal opportunity employer. Send resume and 3 references to:

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To \$35K

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- PROGRAMMER

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Apply your in-depth knowledge of MVS or VM and skills in JES3, CICS, ACF/VTAM to a mixture of technical and account management assignments. You'll provide ongoing support to Amdahl customers in all software related matters.

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...for Field Engineers

Your large systems hardware experience, preferably with 370/158, 168, 3033, will be instrumental in planning, installing, implementing and restoring computer center operations at customer sites. Peripherals experience would be an additional asset.

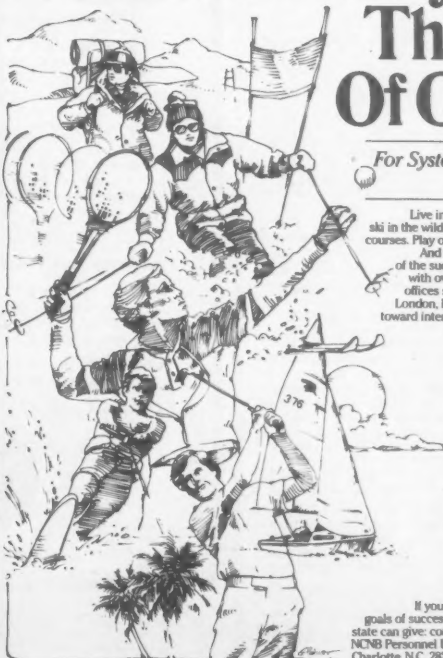
We currently have opportunities for Systems Engineers and Field Engineers in Amdahl Support Centers and Regions throughout the country:

- **Corporate Headquarters** - Product Support/Services Recruiter, MS 300, 1210 E. Arques Avenue, Sunnyvale, CA 94086
- **South Central Region** - Sue Chan, 4801 Massachusetts Avenue, Suite 600, Washington, D.C. 20016
- **Eastern Region** - Phil Beckheim, 4801 Massachusetts Avenue, Suite 600, Washington, D.C. 20016
- **Western Region** - Gilda Mangold, M/S 330, 1250 E. Arques Avenue, Sunnyvale, CA 94086
- **Midwest Region** - Bob Fields, 6400 Shafer Court, Rosemont, IL 60018

Discover the advantage for your career as a member of the Amdahl Support Team — the best in the industry! Send your resume to the appropriate person listed above. We are an equal opportunity employer through affirmative action.

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• **PROGRAMMER ANALYSTS** with one-plus years experience in COBOL, OS/JCL, and TSO. Banking experience in one or more of these application areas is desirable: Deposits, Loans, Trust, Cash Management, Item Processing (CPCS). Applicants should possess good communication skills.

• **SYSTEMS ANALYSTS** with two-plus years experience designing and implementing systems in a similar environment. Banking experience in one or more of these application areas is desirable: Deposits, Loans, Trust, Cash Management, Item Processing (CPCS). Applicants should possess good communication skills.

• **DATA BASE ANALYSTS** with two years experience as a data base analyst in an IMS environment. Responsibilities will include data base design and implementation, performance monitoring and tuning, and interacting with all levels of operations and applications development personnel. Applicants should possess good communication skills. ADF and Data Dictionary experience a plus. DP Environment includes: IBM 3033 AF, MVS SP REL 1/JES 3, TSO, IMS, VTAM.

If you believe your skills can meet our needs...if you'd like your goals of success to be part of ours...if you can enjoy the quality of life our state can give: contact us. Write or call Priscilla Barnett, Personnel Manager, NCNB Personnel Division, COI-6, NCNB Corporation, Charlotte, N.C. 28255. Telephone (collect) 704/374-6796.

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We have openings in most major metropolitan areas, including New York, Boston, Cleveland, Houston, Los Angeles, and New Jersey. The typical SSR has 10 years' DP experience, with extensive skills in at least one major IBM operating system—MVS or VM preferred. We favor skills in and exposure to areas such as: project planning and management; telecommunications; capacity planning and tuning; architecture and hardware; multiple operating systems; and major subsystems (IMS, CICS, VTAM).

MVS Systems Engineers

Here's an opportunity to develop both customer and internal benchmarks. You'll need extensive MVS systems programming experience (RMF, SE, SP, Data Facility, etc.), knowledge of systems tuning techniques, and a background in systems evaluation. VM programming experience a plus.

DOS/VS & DOS/VSE Systems Engineers

You will be working on operating systems modification and performance benchmarks. We need systems engineers with a strong background in Assembler language.

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We have opportunities for professionals with experience selling large mainframes and peripherals in the IBM plug-compatible industry.

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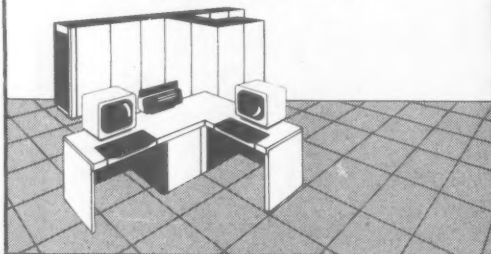
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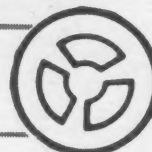
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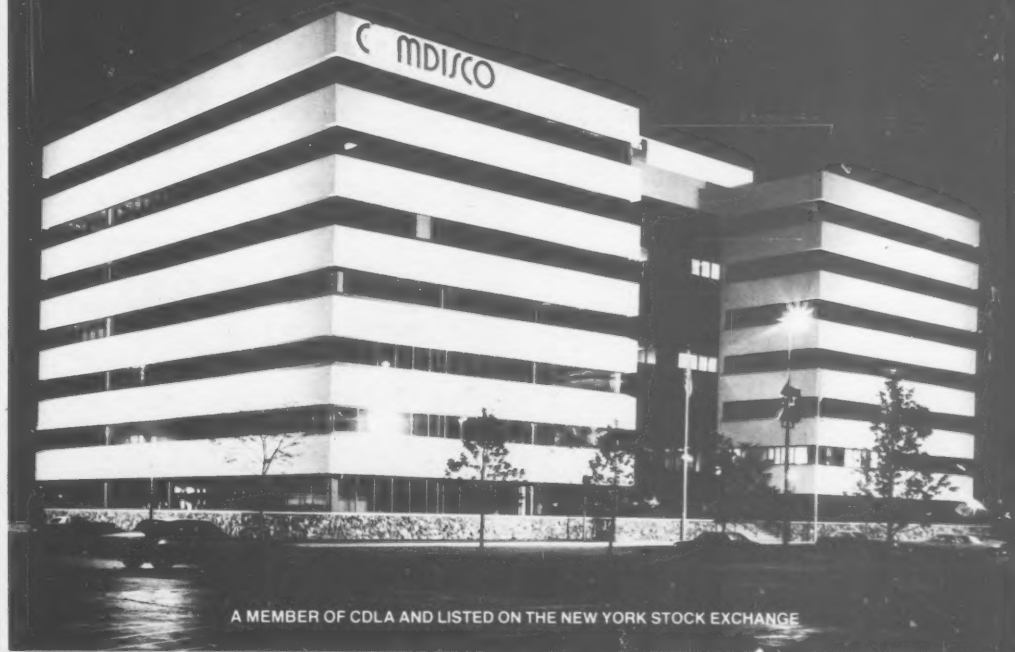
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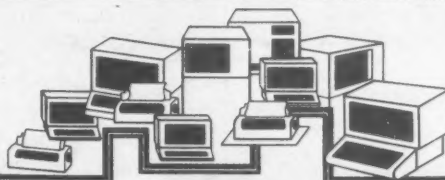
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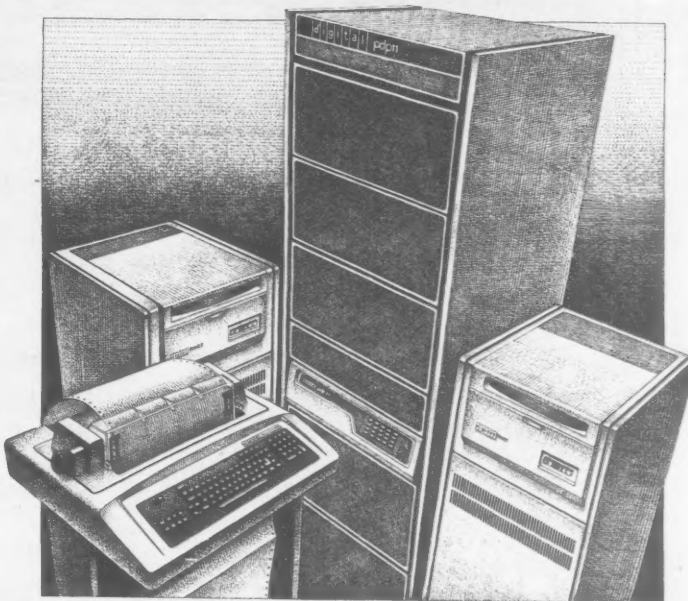
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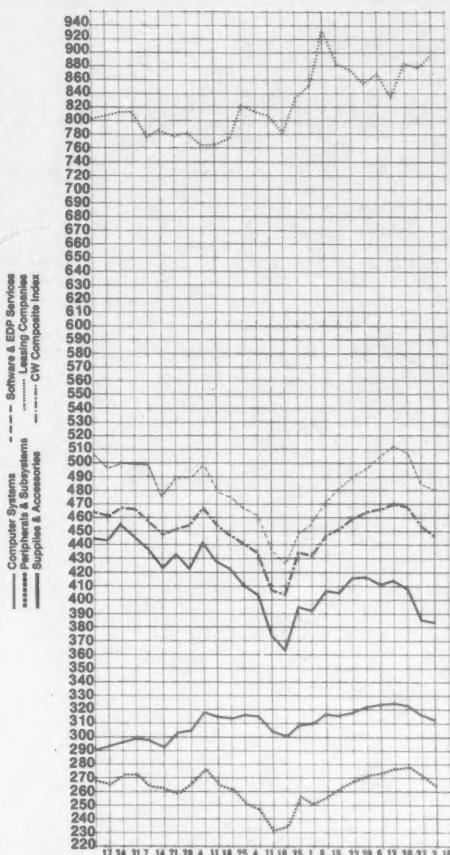
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|--|-------------------------|-------------------------|----------------------|----------------------|-------------------------|------------------|-------------------------|----------------------|----------------------|--------------------------|-------------------------|------------------|----------------------|----------------------|--|--|--|
| | 1981-82 RANGE (1) | CLOSE JUNE 2 1982 | WEEK NET CHNGE | WEEK PCT CHNGE | 1981-82 RANGE (1) | | CLOSE JUNE 2 1982 | WEEK NET CHNGE | WEEK PCT CHNGE | 1981-82 RANGE (1) | CLOSE JUNE 2 1982 | | WEEK NET CHNGE | WEEK PCT CHNGE | | | |
| COMPUTER SYSTEMS | | | | | | | | | | | | | | | | | |
| A ANDAHIL CORP | 18-48 | 20 7/8 | -3/8 | -1.7 | O ADVANCED CORP TECH | 1-8 | 1 1/4 | 0 | 0.0 | X A COMPUTER CONSOLES | 18-28 | 22 | -3/8 | -1.6 | | | |
| N BUREAU OF CORP | 28-72 | 34 1/2 | -3/8 | -1.0 | O ADVANCED SYSTEMS INC | 10-15 | 13 3/4 | -1 1/4 | -9.0 | O COMPUTER DEVICES INC | 4-10 | 7 3/8 | +1/2 | +7.2 | | | |
| O COMPUTER AUTOMATION | 8-28 | 8 1/4 | -1/4 | -2.9 | O ANACORP INC | 10-19 | 11 3/8 | -3/8 | -3.1 | O COMPUTER TRANSCORP | 2-8 | 5 5/8 | 0 | 0.0 | | | |
| N CONTROL DATA CORP | 18-42 | 24 3/4 | -1/2 | -1.9 | O ANALYSTS INTL CORP | 3-14 | 7 | 0 | 0.0 | N COMBAC CORP | 17-28 | 23 3/8 | -1/2 | -2.0 | | | |
| N CRAY RESEARCH INC | 22-48 | 24 3/8 | -3/8 | -1.5 | O APPLIED DATA RES. | 13-25 | 21 1/8 | +1/8 | +0.5 | O DATA ACCESS SYSTEMS | 2-10 | 10 1/8 | 0 | 0.0 | | | |
| N DATA GENERAL CORP | 26-87 | 26 3/8 | -1 7/8 | -6.8 | O ASK COMPUTER SYSTEMS | 11-17 | 15 3/4 | -1/8 | -0.6 | A DATAPRODUCTS CORP | 17-84 | 18 7/8 | -7/8 | -4.4 | | | |
| N DATAPOINT CORP | 12-68 | 13 7/8 | +1/4 | +1.8 | B BENTON & BOWLES | 2-5 | 1 3/4 | +1/8 | +7.6 | O DATARISK CORP | 4-15 | 7 1/2 | -1/8 | -1.8 | | | |
| N DIGITAL EQUIPMENT | 72-113 | 74 5/8 | -1 7/8 | -2.4 | N AUTOMATIC DATA PROC | 22-32 | 25 | +1 1/8 | +4.7 | O BAYCOM INC | 2-5 | 2 1/8 | -1/2 | -18.0 | | | |
| A EDCO INC | 8-18 | 8 3/4 | 0 | 0.0 | O COA COMPUTER ASSOC | 4-25 | 6 | 0 | 0.0 | O DAVID J. HANSON CARLYL | 3-7 | 3 1/2 | -1/4 | -5.8 | | | |
| N ELECTRONIC ASSOC. | 5-13 | 7 3/4 | +1/4 | +3.3 | O COMPUTER HORIZONS | 1-9 | 5 3/4 | -1/4 | -12.5 | O DECISION DATA CORP | 3-6 | 4 1/2 | -1/4 | -9.2 | | | |
| N FLOATING POINT SYST | 13-30 | 20 7/8 | -1/8 | -0.3 | O COMPUTER NETWORK | 4-9 | 7 1/8 | -1/4 | -3.3 | O DELTA DATA SYSTEMS | 2-4 | 1 7/8 | -1/8 | -6.2 | | | |
| N FOXBORO | 33-82 | 35 7/8 | -1/8 | -0.3 | N COMPUTER SCIENCES | 11-30 | 12 1/4 | +1/4 | +2.0 | N ELECTRONIC N & H | 3-9 | 4 | -1/8 | -3.0 | | | |
| O FULCRUM CORP GRP | 1-3 | 1 1/4 | 0 | 0.0 | O CORPUS TASK GROUP | 10-23 | 11 3/4 | 0 | 0.0 | O EVANS & SUTHERLAND | 18-24 | 24 | 0 | 0.0 | | | |
| N GENERAL AUTOMATION | 3-18 | 8 3/8 | +1/8 | +2.9 | O COMPUTER USAGE | 2-10 | 2 3/8 | -1/4 | -9.5 | N GEN'L DATA CORP | 7-19 | 8 7/8 | +3/8 | +4.4 | | | |
| N HARRIS CORP | 28-60 | 25 5/8 | -1/2 | -1.9 | O CONSERV CORP | 8-18 | 13 1/2 | -1 | -8.0 | O GENERAL TERMINAL CP | 0-4 | 3/8 | 0 | 0.0 | | | |
| N HEWLETT-PACKARD CO | 33-54 | 43 1/2 | 0 | 0.0 | O EDWARDS | 8-21 | 5 3/8 | -1/8 | -2.1 | O GREAT SOUTHWEST INS | 1-12 | 5 1/4 | 0 | 0.0 | | | |
| N HONEYWELL INC | 63-115 | 87 7/8 | -1 3/8 | -1.9 | N CULLINAN DATABASE | 15-37 | 30 1/2 | -1 | -3.1 | N HAZELTINE CORP | 18-35 | 27 7/8 | -5/8 | -2.1 | | | |
| N IBM | 48-73 | 62 | 0 | 0.0 | O DATA DIMENSIONS INC | 0-4 | 1/4 | 0 | 0.0 | O INFORMATION INTL INC | 8-17 | 12 | 0 | 0.0 | | | |
| O IPL SYSTEMS INC | 8-13 | 6 1/2 | +1/4 | +4.0 | O DATATREK | 1-8 | 8 1/8 | 0 | 0.0 | O INTEL CORP | 21-51 | 29 3/4 | -1/4 | -0.8 | | | |
| O MAGNUSON CORP SYST | 3-32 | 3 3/8 | -1/8 | -3.5 | O DBT CORP | 4-11 | 8 | 0 | 0.0 | O IPL SYSTEMS INC | 5-15 | 6 1/2 | +1/4 | +4.0 | | | |
| N MANAGEMENT ASSIST | 8-28 | 12 5/8 | +3/8 | +3.0 | O DYATRON CORP | 2-11 | 9 | -1/2 | -14.2 | O LUNDY ELECTRONICS | 7-18 | 9 3/8 | -7/8 | -8.5 | | | |
| O MINI-COMPUTER SYST | 0-4 | 3/4 | -1/8 | -14.2 | N ELECTRONIC DATA SYST | 15-39 | 28 | +1 1/4 | +4.6 | O MBI DATA CORP | 11-27 | 17 5/8 | -1/8 | -0.7 | | | |
| N MODULAR COMPUTER SYS | 7-32 | 7 3/4 | 0 | 0.0 | O INFORMATIONICS INC | 10-23 | 18 | -1 | -5.2 | O NETWORK SYSTEMS CORP | 14-25 | 19 1/2 | +1 | +5.4 | | | |
| N MODERN DATA SCI | 10-32 | 11 | +1/8 | +1.1 | O INSTE CORP | 1-3 | 2 3/4 | +1/2 | +22.2 | O ORES | 3-8 | 3 1/2 | 0 | 0.0 | | | |
| N NCR | 38-78 | 43 3/4 | -5/8 | -1.3 | O IPS COMPUTER MARKET | 1-4 | 1 1/4 | +1/8 | +11.1 | N PARADYNE CORP | 25-32 | 33 5/8 | +1/8 | +0.3 | | | |
| M PERKIN-ELMER | 18-36 | 19 3/8 | +1/8 | +0.6 | O KEANE ASSOCIATES | 4-8 | 8 1/2 | 0 | 0.0 | N PENNELL CORP | 7-17 | 8 1/8 | -1/2 | -1.3 | | | |
| N PRIME COMPUTER INC | 17-48 | 21 7/8 | +7/8 | +4.1 | A LIDSON | 12-38 | 13 | -1/4 | -1.8 | O RANER CORP | 8-23 | 18 1/4 | 0 | 0.0 | | | |
| N SPERRY CORP | 24-65 | 33 5/8 | -1 | -4.0 | O MGT SCI AMER INC | 17-28 | 21 1/8 | -1/8 | -0.5 | N RECOGNITION EQUIP | 4-21 | 4 5/8 | 0 | 0.0 | | | |
| O TANDEN COMPUTERS INC | 13-35 | 28 1/4 | +1/4 | +0.9 | O MATHEMATICAL INC | 12-26 | 15 | -1/4 | -1.6 | O SCAN DATA | 1-5 | 1 1/8 | -1/8 | -10.0 | | | |
| N TERAB INSTRUMENTS | 71-191 | 84 3/4 | +1/4 | +0.2 | O MATHEMATICAL APP GRP | 14-38 | 17 1/2 | -1 | -5.4 | N STANLEY TECHNOLOGY | 18-10 | 22 3/8 | 0 | 0.0 | | | |
| A WANG LABS. | 22-46 | 24 3/4 | +1/8 | +0.3 | O NATIONAL DATA CORP | 14-28 | 17 1/4 | 0 | 0.0 | O SYKES DATATRONICS | 8-34 | 14 1/4 | 0 | 0.0 | | | |
| LEASING COMPANIES | | | | | | | | | | | | | | | | | |
| O BOOTH FINANCIAL CP | 18-29 | 23 3/4 | 0 | 0.0 | O PARADIGM SYSTEMS | 8-15 | 11 1/4 | -1/4 | -2.1 | A T BAR INC | 12-19 | 13 7/8 | -1/4 | -1.7 | | | |
| N COMDISC INC | 18-27 | 17 3/8 | +1/8 | +0.7 | N PLANNING RESEARCH | 5-13 | 6 3/4 | 0 | 0.0 | A TEC INC | 4-11 | 8 3/8 | +1/4 | +3.8 | | | |
| B COMMERCE GROUP CORP | 1-2 | 1/2 | +1/8 | +33.3 | O PROGRAMMING & SYS | 1-3 | 1 3/8 | 0 | 0.0 | N TEKTRONIX INC | 43-70 | 53 | -1/4 | -0.4 | | | |
| O COMPUTER INVESTS GRP | 1-4 | 3/8 | 0 | 0.0 | O REYNOLDS & REYNOLD | 16-28 | 21 | +1/4 | +3.2 | N TELEX | 5-10 | 8 1/4 | -3/8 | -4.3 | | | |
| O CONTINENTAL INFO SYS | 4-8 | 6 3/4 | +1/8 | +1.8 | O SEI CORP | 17-26 | 24 1/2 | -1/4 | -1.0 | O TESDATA SYSTEMS CP | 4-17 | 4 3/8 | -1/8 | -2.7 | | | |
| N DPF INC | 5-13 | 8 5/8 | -3/8 | -4.1 | O SHARED MEDICAL SYST | 28-37 | 29 3/8 | +3/8 | +1.2 | O TIMEPLEX INC | 7-19 | 9 1/2 | +1/8 | +1.3 | | | |
| O ITEL | 1-15 | 3/4 | -1/8 | -14.2 | O STSC INC | 8-26 | 9 3/4 | -1/8 | -1.2 | O WILTR INC | 1-3 | 1 1/2 | 0 | 0.0 | | | |
| O LEASAPAC CORP | 1-2 | 1/8 | 0 | 0.0 | O SCIENTIFIC COMPUTERS | 6-18 | 7 | -1/4 | -3.4 | SUPPLIES & ACCESSORIES | | | | | | | |
| N U.S. LEASING | 18-30 | 24 1/2 | +1/4 | +1.0 | O SOFTWARE AG | 7-23 | 6 3/4 | -3/8 | -4.1 | N AMERICAN BUS PRODS | 11-17 | 12 5/8 | +1/8 | +1.0 | | | |
| PERIPHERALS & SUBSYSTEMS | | | | | | | | | | | | | | | | | |
| N AM INTERNATIONAL | 1-15 | 1 1/4 | 0 | 0.0 | N TYMSHARE INC | 16-58 | 17 1/2 | -1 1/4 | -8.6 | O BALTIMORE BUS FORM | 1-2 | 1 1/4 | 0 | 0.0 | | | |
| A ANDERSON JACOBSON | 9-26 | 10 1/4 | -1/8 | -1.2 | A USB CORP | 11-18 | 12 3/4 | +1 3/8 | +12.0 | N BARRY HIGHT | 15-24 | 18 | 0 | 0.0 | | | |
| O AUTO-TROL TECHNOLOGY | 8-22 | 11 1/2 | -1/8 | -1.0 | N WLY CORP | 7-25 | 8 | +1/8 | +1.4 | O CYBERNETICS INC | 1-2 | 1 | 0 | 0.0 | | | |
| BANCTEC INC | 11-25 | 14 | -2 1/2 | -18.0 | | | | | | | | | | | | | |
| O BEEHIVE INT'L | 8-18 | 7 1/4 | -1/4 | -3.3 | | | | | | | | | | | | | |
| A BOLT-BERANEK & NEH | 9-25 | 18 1/4 | +3/8 | +2.0 | | | | | | | | | | | | | |
| O CARBEX CORP | 2-9 | 2 7/8 | +1/8 | +3.3 | | | | | | | | | | | | | |
| N CENTRONICS DATA COMP | 7-40 | 3 3/8 | -1/2 | -4.2 | | | | | | | | | | | | | |
| A CETEC CORP | 4-8 | 4 1/4 | -1/8 | -2.0 | | | | | | | | | | | | | |
| O COGNITRONICS | 2-11 | 3 3/4 | -1/8 | -3.2 | | | | | | | | | | | | | |
| O COMPUTER COMMUN. | 1-2 | 1/2 | -3/8 | -42.8 | | | | | | | | | | | | | |
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